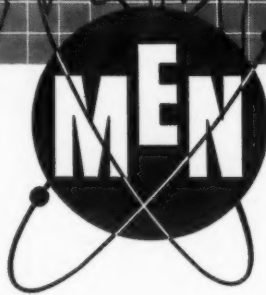


MEDICAL ELECTRONICS NEWS



Instruments Publishing Co.
845 Ridge Ave.
Pittsburgh 12, Pa.
Form 3547 Requested

INSTRUMENTATION, ELECTRONIC AND ELECTROMECHANICAL DEVICES FOR USE IN
BIO-MEDICAL RESEARCH, DIAGNOSIS AND THERAPY; RADIOLOGY; AIR POLLUTION, ETC.

TRADEMARK

Print order this month 39,000

VOLUME 1—NUMBER 3

SEPTEMBER 1961

A Proposal For A Medical Instrumentation Center

W. G. KUBICEK*, Ph.D.

DURING THE FISCAL YEAR 1961 the total estimated obligations of federal funds for medical and other health related research activities is \$649,300,000.¹ The agency with the largest research program in these areas in the Department of Health, Education, and Welfare, with an anticipated budget of \$468,100,000.00. A brief listing of the expenditures of the various agencies for medical and other health related research activities is given in Table 1.

**TABLE 1—FEDERAL
EXPENDITURES FOR MEDICAL
AND RELATED RESEARCH**

	Million
Department of Health, Education and Welfare	\$468.1
Atomic Energy Commission	55.1
Department of Defense	49.4

*Professor, Department of Physical Medicine and Rehabilitation, University of Minnesota Medical School, Minneapolis 14, Minnesota.

National Science Foundation ..	29.8
Veterans Administration	26.5
Department of Agriculture	9.1
National Aeronautics and Space Agency	8.0
Federal Aviation Agency	1.2
Department of State	1.0
Tennessee Valley Authority	0.3

Despite the large total expenditure of federal funds for medical and health-related research, little has been done to direct relatively small amounts of federal research money into improvements in bio-medical instrumentation. Great technological advances have occurred during recent years in the fields of physics, engineering, chemistry and other related sciences. A great gap exists at present in the application of the skills and knowledge available in these fields to the area of medical research. All too frequently the recipient of a federal research grant must struggle along with obsolete instruments and a poorly trained research staff. The scope

and complexity of modern biological and medical research have advanced beyond the limits of sensory perception and intuition of the old masters of past decades. Improvements in the instrumentation available to scientists working in the field of biological and medical research would result in a substantial improvement in the effective use of the funds appropriated by the Congress for this purpose.

There is a great need for advanced Instrumentation Centers to provide the following functions:

- To conduct research programs to find methods not presently available for measuring and recording reactions and characteristics of living systems.
- To provide facilities and personnel for the interdisciplinary training of engineers, physicists, chemists and others ordinarily not acquainted with the problems of bio-medical instrumentation, to conduct research and development programs in this field.

Continued on page 10

Dear Reader:

Hospitals are using computers and data handlers in many different ways. We will report the specific information in a forthcoming issue of **MEDICAL ELECTRONICS NEWS**. Meanwhile, our readers can facilitate this survey by replying to the following questions.

- We are using computers for the following bio-medical applications:

No. & Type: _____

Applications: _____

- We are using data logging equipment for these applications:

No. & Type: _____

Applications: _____

Signed _____

Address _____

SEND TO: M-E-N, 845 RIDGE AVE., PITTSBURGH 12, PA.

MEDICAL ELECTRONICS NEWS serving a vital and growing market

If you manufacture electronic or instrumentation devices for use in the bio-medical field, then you should advertise in M-E-N.

M-E-N pinpoints your buying audience—the doctors and scientists who buy and use medical electronic and instrumentation equipment for research, diagnosis, and treatment.

If your equipment has application in diagnosis, surgery, therapy, radiology, or research—or in the detection and control of air pollution and other elements affecting public health—M-E-N is ideally suited to carry your ad message to those who can and will apply your equipment.

Ad space reservations are acceptable any time up to the December 1 closing date, for the December issue. Contact any of our District Managers listed on page two herein.

MEDICAL EQUIPMENT MANUFACTURERS' REPS

Some openings still exist for "rep" sponsorship of M-E-N to their customers and prospects.

For details on how this sponsorship can help you in your sales work, write to Mr. Richard Rimbach, Publisher, Medical Electronics News, 845 Ridge Ave., Pittsburgh 12, Pa.

ADV-REP

MEDICAL ELECTRONICS NEWS

Instrumentation, Electronic and Electromechanical Devices for use in Bio-Medical Research; Diagnosis and Therapy; Radiology; Air Pollution, etc.

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FIELD SERVED

Each issue will reach over 38,000 doctors and technicians active in clinic and hospital research, medical and biological research institutes, medical schools, public health research laboratories, therapy, air pollution, etc.

This, in effect, means virtual blanket coverage of the entire medical and biological research market.

ISSUANCE AND CLOSING DATES

Published quarterly in March, June, September and December. Last forms close on 1st of month of publication. In 1962, Medical Electronic News will appear bi-monthly.

EDITORIAL FUNCTION & SCOPE

Medical Electronics News will provide a means whereby the results and techniques of the instrumentation and electronics specialties can be made more generally available.

As part of its editorial scope, each issue will report the new instruments, new techniques, and new developments in the field of instrumentation and electronics.

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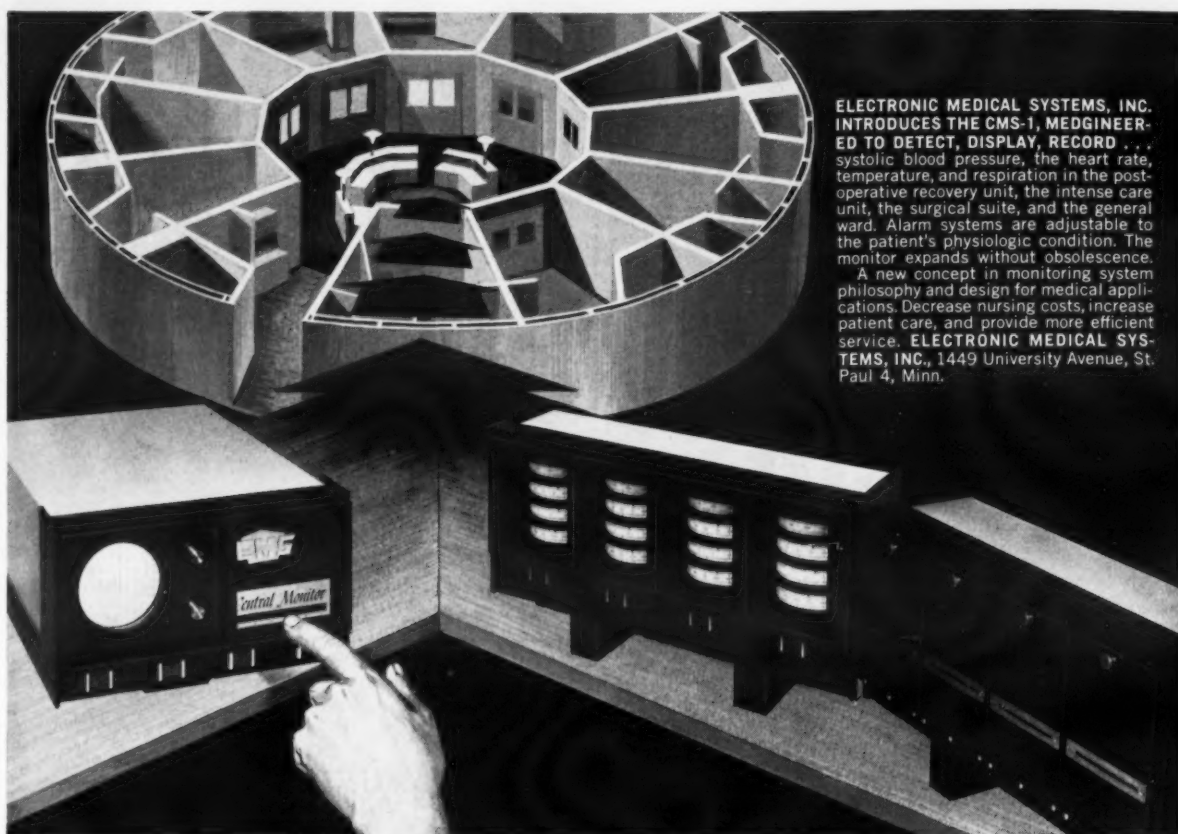
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STEP INTO THE FUTURE. VISIT BOOTH 106/ DURING YOUR STAY IN ATLANTIC CITY.
CIRCLE 235 ON READER-SERVICE CARD

ELECTRONIC MEDICAL SYSTEMS, INC. INTRODUCES THE CMS-1, MEDICINEER-ED TO DETECT, DISPLAY, RECORD... systolic blood pressure, the heart rate, temperature, and respiration in the post-operative recovery unit, the intense care unit, the surgical suite, and the general ward. Alarm systems are adjustable to the patient's physiologic condition. The monitor expands without obsolescence. A new concept in monitoring system philosophy and design for medical applications. Decrease nursing costs, increase patient care, and provide more efficient service. ELECTRONIC MEDICAL SYSTEMS, INC., 1449 University Avenue, St. Paul 4, Minn.

LETTERS TO THE EDITOR

Editor, MEN:

Regarding measurement of $C^{14}O_2$ have M-18 (June, 1961) look into vibrating-reed electrometers (such as Cary). This will measure the $C^{14}O_2$ directly, much more accurately, and with a much greater sensitivity.

Robert L. Pollack, Ph.D.
U. S. Dept. of Agriculture
Agriculture Research Service
Eastern Utilization Research & Dev. Div.
600 East Mermaid Lane
Phila. 18, Pa.

Editor, MEN:

Referring to inquiry M-55 which requested information about heart rate in unrestrained, unanesthetized rats. Personnel of the School of Aerospace Medicine have developed a seven gram "mouse-mitter" which transmits a modulated radio signal of the mouse heart beat to a receiver/recorder. This transmitter, which is mounted on the mouse's back, has an effective range of about 12 inches, leaving the animal totally unrestrained.

If you would like to have more information regarding this device you may write the Bioelectronics Section, Medical Research Division, SAM, Brooks Air Force Base, Texas.

H. G. Clamann, M.D.
Department of Space Medicine
School of Aerospace Medicine
USAF Aerospace Medical Center (ATC)
Brooks Air Force Base, Texas.

Editor, MEN:

I read Volume I, Number 2, of *MEDICAL ELECTRONICS NEWS*, and I liked what I read. It is time that man started organizing the data he has accumulated about himself. Year after year, intelligent men have noticed biological events, but most of these findings have been lost to their successors. If man could have gathered all these findings, checked them and transmitted them to the following generations, we would be more advanced than we are now. *MEN* can and will have an important role in the awakening of man to this necessity.

Bernard Talbot, M.D. (Physiatrist)
P. O. Box 1001
New Haven 4, Conn.

Editor, MEN:

We have watched with interest the development of your publication, *MEDICAL ELECTRONIC NEWS*. We have found our publicity and advertising very productive and we feel that *MEN* fills an important gap in the medical instrumentation field... Interest generated by our own advertising and promotion (including a very productive news release in *MEN*) has been beyond our fondest expectations.

Harold E. Daly, Jr.
Advertising Assistant
International Equipment Co.
Boston 35, Mass.

Editor, MEN:

The letter from Joe N. Gadel, consulting physicist, of East Orange, New Jersey, illustrates the great lack of communication between engineers, physicists and medical personnel. A very good capacitance manometer has been in use for at least ten years. Its design is based on work by Dr. John Lilly, and it has been commercially produced by the Technitrol Engineering Company of Philadelphia for at least nine years. Both this instrument and the one drawn by Mr. Gadel suffer from the necessity of requiring a fluid transmission line, as do any except those small enough to fit on a catheter tip.

Thank you very much for this service, and more power to you in your cross-communication efforts.

Richard B. Shepard, M.D.
The University of Alabama
Medical Center
Medical College of Alabama
Department of Surgery
Birmingham, Alabama

Editor, MEN:

I am writing in reference to inquiry M-16 in the inquiry column of your June 1961 edition. I have been doing pediatric and animal biochemistry for the past two years. The volume normally used by me for blood urea nitrogen is 0.05 ml. The method which utilizes an extract of Jack Bean Meal, can also be used with less amounts of serum or whole blood.

Alfred B. Miller, Jr.
Microchemist
The Institute of Pathology
City of New York
Dept. of Hospitals
Kings County Hospital Center
Brooklyn 3, N. Y.

Editor, MEN:

I wish to thank you for your copies of *MEDICAL ELECTRONIC NEWS*. I have found them to be most interesting and have already passed on the copies to our Department of Cardiac Surgery.

As head of the Division of Ophthalmology, I am interested in equipment for electroretinography—particularly an arrangement by which the oscilloscope tracing can be recorded photographically. I would appreciate any information which you might have regarding companies which can supply the entire apparatus.

J. Winston Duggan, M. D.
Division of Ophthalmology
Security Building
10023-103 Street
Edmonton, CANADA

(See announcement on next page.)

Editor, MEN:

Your new publication, *Medical Electronics News*, provides interesting reading and should be of tremendous service to the profession. It should be a highly successful publication.

William N. Hesketh
Xerox, Inc.
Rochester 3, N. Y.

**MEDICAL
ELECTRONICS**

NEWS

ECG, X-rays by Phone

NEW YORK, N. Y.—Instant telephone transmission of medical data directly from the human body to remote recording instruments anywhere in the country will soon be possible through use of special DATA-PHONE data sets now being developed by the Bell Telephone System (Rockefeller Center, 1271 Ave. of Americas, New York 20, N. Y.).

Harvey J. McMains, American Telephone & Telegraph Administrator of Data Communications Planning, revealed that a system for transmitting "live" electrocardiographs is now under development and will be available



to doctors and hospitals some time next year. A preview demonstration was given at the American Medical Association's annual convention. A medical attendant telephoned the consulting specialists after attaching electrodes to the patient. Then, by pushing the data button on a DATA-PHONE set, heart pulsations were transmitted over the telephone to a Honeywell 906c Visicorder (Minneapolis-Honeywell Regulator Co., Heiland Div., 5200 E. Evans Ave., Denver 22, Colo.) at the receiving location.

The Bell System is also currently conducting tests on the transmission of X-rays by telephone and is investigating the most efficient and economical means of sending other types of electronic medical data over telephone facilities.

CIRCLE 36 ON READER-SERVICE CARD

Air Pollution

SCHENECTADY, N. Y.—General Electric Company has developed a device which promises important help in the battle against air pollution. The "condensation nuclei detector" (not yet commercially available) is so sensitive for detecting tiny airborne particles that it could find a single speck lost among 1,000 trillion other specks. This would be like spotting a solitary grain of white sand on a beach full of yellow grains. "Condensation nuclei," smallest airborne particles in existence, are invisible but extremely numerous. They are considered a major factor in smog formation.

The Detector works by causing droplets to be formed artificially around each tiny nucleus. The nuclei then grow to microscopic size, which is large enough to cause scattering of a light beam directed into their midst. Measured electronically, the light scattering indicates the concentration of nuclei in the man-made fog. It takes but 0.005 of a second to form a measurable cloud.

It has been estimated that air pollution is presently costing the American public more than \$10 billion a year in corrosion, crop damage and impairment of health.

CIRCLE 37 ON READER-SERVICE CARD

**Biomedical Instrumentation
Conference**

NEW YORK, N. Y.—Forty-five manufacturers of electronic instruments for biomedical applications (including representatives of companies in seven European countries) set up 65 booths and displayed more than 100 new products at the Fourth International Conference on Medical Electronics combined with the 14th Annual Conference on Electrical Techniques in Medicine and Biology.

Also, more than 270 papers were delivered (70 of them by authors from 20 foreign countries). Attendance exceeded 2,000.

Reprints of Conference papers are available from Mr. Lewis Winner, 152 W. 42nd St., New York 36, N. Y.

Research Grants & Awards

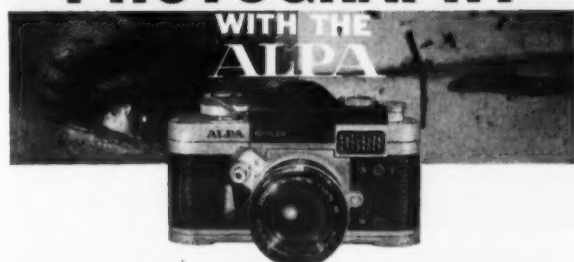
BETHESDA, MD.—The National Institutes of Health, the Public Health Service Research Center at Bethesda, report that 269 research grants and 447 fellowships totaling \$17,806,557 were awarded during June, 1961. Of the total, \$12,399,211 was allocated to support 393 new research grants and fellowship awards. The remaining \$5,407,346 was for the continuation of 106 previously approved research grants totaling \$3,323,597 and 217 fellowships totaling \$2,083,749. (One fellowship is in Electrical Engineering, one is in Physics.)

**New Editorial
Service**

The December issue of **MEDICAL ELECTRONICS NEWS** will introduce a valuable new editorial service. In December, and in each issue thereafter, MEN will survey equipment that serves specific functions. The subject of the first survey will be Oscilloscope Camera Recorders. Every camera and attachment apparatus available for use in photographing oscilloscope traces will be described, illustrated, and the source identified.

Surveys scheduled for subsequent issues will present • direct-writing oscillograph recorders • light-beam galvanometer oscillographs • special galvanometer-type recorders • potentiometer (voltage-balance) servo recorders • force-balance servo recorders • X-Y recorders • operation (event) recorders • multiple-style recorders • sweep recorders, and • special-purpose recorders.

**MACRO and MICRO
PHOTOGRAPHY**



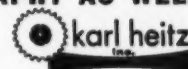
Through ALPA's parallax-free through-the-lens viewing system you see the ultra luminous groundglass image in exact 1:1 LIFESIZE, for absolutely accurate framing, focusing and depth-of-field control. And the diagonal split-image rangefinder (with clear circle) double-checks the focus instantly, with any lens, at any distance, for any magnification.

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One single adapter ring attaches the ALPA to any microscope (endoscope, oscilloscope, etc.) for photomicrography of up to 1500x magnification.

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Please write for free illustrated booklet MEA-9 or send \$1.00 for 48-page booklet, "Macro and Microphotography with the ALPA."



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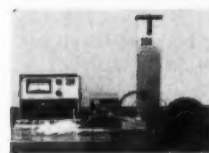
CIRCLE 1 ON READER-SERVICE CARD

**BETTER WAYS
TO
MEASURE
BLOOD PRESSURE**



OPHTHALMIC ARTERY

The Decker 315 Pulsensor is a simple, comfortable instrument for securing quantitative physiological data on cerebral circulation by measuring pressure in the ophthalmic artery, a branch of the internal carotid artery and the circle of Willis. A headpiece creates independent sealed air chambers in front of each ophthalmic orbit. Pulsation of the ophthalmic artery is sensed as a change in pressure in the sealed chamber and indicated by an audible tone. Air pressure in the chamber is slowly increased and monitored with a mercury manometer. When the pressure is sufficient to occlude the ophthalmic artery, the tone ceases and systolic pressure can be read directly from the manometer. A complete system for simultaneous recording of pulse and pressure information is also available.



LABORATORY ANIMALS

By automatically measuring pulse rate and blood pressure of laboratory animals, the 320 Caudal Plethysmograph solves a problem that has long faced those studying drug effects on test animals. The cauda (or other extremity) is enclosed in a sealed chamber and fitted with an occluding cuff. The pulse is sensed as varying pressure in the chamber and recorded. Cuff pressure is increased until the artery is occluded, at which point (systolic pressure) the pulse indication ceases. Dynamic recording of the information correlates occlusion with cuff pressure and indicates pulse rate as well.

THE DECKER CORPORATION Bala-Cynwyd, Pa.

Technical data available on request.



CIRCLE 2 ON READER-SERVICE CARD

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designed to
SURGICAL & MEDICAL REQUIREMENTS

NEW UNIT FOR FROZEN SECTIONING

Whenever temperatures are important in the development of Surgical/Medical equipment, Cincinnati Sub-Zero Products offers the competent services of its engineering staff.

From the low temperature applications in the fields of metallurgy and electronics comes the experience, acquired over a quarter century, to engineer reliable temperature control equipment for air or liquid chilling.

We invite inquiries from all research and medical organizations.

Hypothermia accurately controlled and indicated in new blood temperature converter.


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3930-00 Reading Rd. • Cincinnati 29, Ohio

CIRCLE 3 ON READER-SERVICE CARD

RKG¹⁰⁰ radio-electrocardiograph

EKG During Exercise— Now A Practical Procedure



The electrocardiogram during exercise has now become a practical procedure for office, hospital or research laboratory with the development of RKG 100, the radio-electrocardiograph. The RKG 100 is a miniaturized radio broadcasting system which relays electrocardiographic waves from subject to recording equipment. It eliminates all connective cables between patient and apparatus and permits unrestricted recording of EKG's while exercising or undergoing the physical and emotional stress of everyday activity. The system operates on an authorized radio frequency allocated by the Federal Communications Commission. It has been used successfully with more than 1,200 patients performing mild (Master Two-Step Test) or strenuous (stationary bicycle) exercise.

EKG During Exercise • Continuous Monitoring for Hospital or Research

WRITE: **TELEMEDICS INC.**
SOUTHAMPTON 2, PENNSYLVANIA
A Subsidiary of Vector Manufacturing Company, Inc.
CIRCLE 4 ON READER-SERVICE CARD

NEWS Continued



K. C. ROCK (left) has been named electronic medical systems manager, and **WILLIAM D. OWENS** is general manager of Minneapolis-Honeywell's Heiland Division, Denver.

Standard for Measuring Blood pH

WASHINGTON, D. C.—The National Bureau of Standards has proposed a standard for determining the pH of blood. A buffer solution containing potassium dihydrogen phosphate and disodium hydrogen phosphate, the recommended standard has a pH in the physiologically important range 7 to 8. It will be particularly useful to the clinician, research medical scientists, and to the physical scientist investigating acid-base behavior in the middle of the pH range.



FIGURE 1

FIGURE 2



Instruments at Memorial Hospital of Long Beach

Long Beach, California

THE MODERN HOSPITAL can be identified by its use of the newer electronic instruments. At Memorial Hospital of Long Beach these instruments are being used: Cardiac Monitor, Chloridometer, Colorimeter, Electronic Surgical Knife, Patient-Intercom and Patient Control Panel, Floor Conductivity Tester, Shoe Conductivity Tester, Ultrasonic Washer, Remote Control Autoclave.

Other electronic equipment includes: Cardiac Pacemaker, ECG, Closed Circuit TV Monitor, X-ray Image Amplifier, Patient Monitor, EMG, Electronic Lung Capacity Device, Autoanalyzer, Blood Cell Counter, Photometer, Telephone Recorder.

The table lists some of the apparatus, including the manufacturer.

A full-time electronics technician is employed to maintain the equipment.

Equipment	Manufacturer
1. Cardiac Monitor	Dallons
2. Colorimeter	Technicon Instrument Co.
3. Electronic Surg. Knife	Birtcher (Bovie)
4. Floor Conductivity Tester	Statitest (Shandon Scientific Co., Ltd.)
5. Shoe Conductivity Tester	Statitest
6. Ultrasonic Washer	Pitcher
7. Remote Control Autoclave	Wilmet Castle
8. Cardiac Pacemaker	Birtcher
9. E.C.G.	Sanborn
10. Closed Circuit T.V.	Packard Bell
11. X-ray Image Amplifier	Pickering X-ray
12. Patient Monitor	Electronics for Medicine
13. E.M.G.	Meditron
14. Lung Capacity Instrument	Collins
15. Autoanalyzer	Technicon
16. Blood Cell Counter	Coulter
17. Photometer	Coleman
18. Patient Telephone Recording & Billing	General Telephone Co.
19. Patient Control Panel	Signal Systems

Fig. 1 shows a patient's cardiac activity being monitored and recorded; Fig. 2, measuring lung capacity. Fig. 3 is the EEG; Fig. 4 is an electronic surgical knife. In the operating room complex are a floor conductivity tester (Fig. 5) and a shoe conductivity tester (Fig. 6). If the floor loses conductivity, a sensing unit sets off an alarm. In the lab a Chloridometer (Fig. 7) measures chloride-ion content of blood serum more accurately than by chemical titration. The Autoanalyzer (Fig. 8) triples the number of blood plasma samples handled at five times former accuracy. The ultrasonic washer (Fig. 9) and remote

control autoclave (Fig. 10) also are more efficient and effective. At the switchboard (Fig. 11), nerve center of the hospital, operators keep track of doctors as they enter and leave, maintain contact with patients through an intercom system (Fig. 12), monitor an alarm system and closed-circuit TV.



FIGURE 3



FIGURE 4

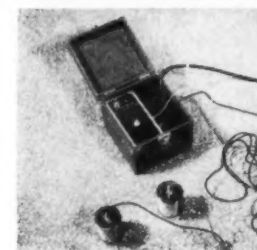


FIGURE 5

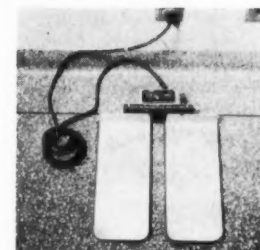


FIGURE 6

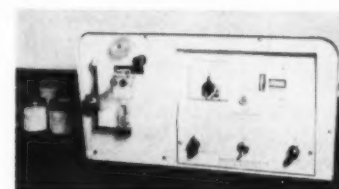


FIGURE 7



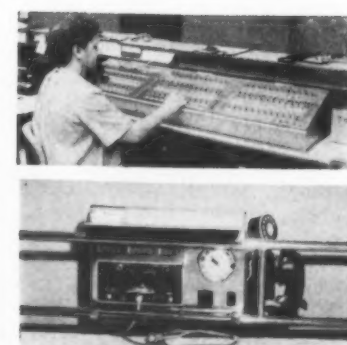
FIGURE 8



FIGURE 9



FIGURE 10



FIGURES 11 and 12

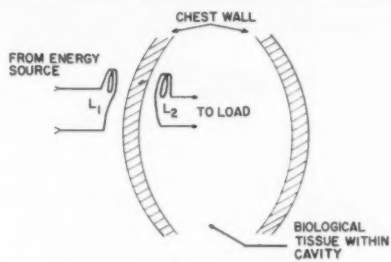


Fig. 1. Schematic diagram

The successful use of artificial heart-lung equipment for the temporary replacement of the heart during open-heart surgery has stimulated interest in the development of implanted artificial hearts for the permanent replacement of diseased organs. Preliminary research into the problems involved in the development of such a heart is underway in several laboratories.

In a paper (presented at IRE International Convention, 1961, N. Y.) entitled "High-Level Electromagnetic Energy Transfer through a Closed Chest Wall," Dr. John C. Schuder, Dr. Hugh E. Stephenson, Jr., and John F. Townsend of the Department of Surgery, University of Missouri Center, Columbia, Missouri, describe a means of supplying energy to such an artificial heart. The method employed by them involves

inductive electromagnetic coupling between two thin, pancake-shaped coils. One silastic covered coil is surgically attached to the inner chest wall while the other coil is placed on the outside of the chest (Fig. 1).

With this arrangement, experimental research on dogs indicates that 50 watts of power may be transmitted through the chest wall with no apparent discomfort to the animal and with low energy losses in the coupling coils and biological tissue. The 50-watt level is somewhat in excess of the maximum anticipated input power requirements for an artificial heart. It is many thousands of times greater than the average power level involved in the operation of internal pacemakers which recently have been employed to supply impulses for the electrical stimulation of certain categories of diseased hearts.

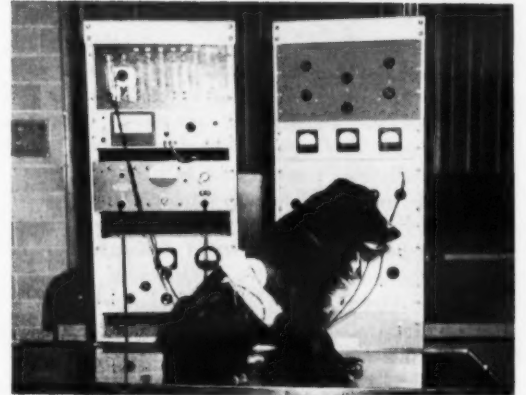


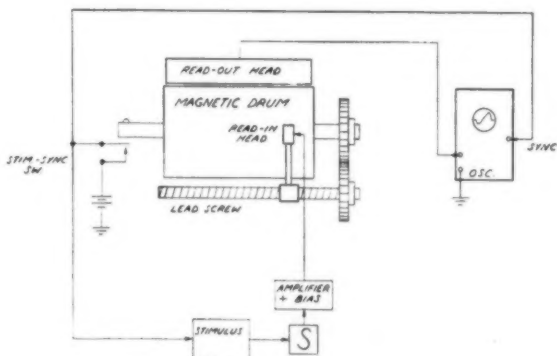
Fig. 2. Experimental subject and apparatus

The Magnetic Drum Average Response Computer

MICHAEL TOBIN

Biophysics Laboratory
Department of Psychiatry
State University of New York
Brooklyn 3, New York

IN NEUROPHYSIOLOGICAL STUDIES it is sometimes necessary to measure the electrical response to external stimuli. The response is frequently masked by larger spontaneous electrical potentials. Several electronic computational methods have been proposed to negate this activity. Unfortunately, the instrumentation is generally costly and complex and hence has had only limited application to research and clinical studies. A new and simpler method of com-



BLOCK DIAGRAM of magnetic drum average response computer.

putation of evoked potentials is proposed which utilizes a rotating magnetic drum for the initiation of stimuli and for the storage and summation of data.

A point on a rotating drum initiates the stimulus. The incoming data is fed to a narrow magnetic head which is in contact with the drum and is advanced axially by a synchronous lead screw. Hence, the stimulus response is automatically aligned on the spiral magnetic tracks being laid on the drum. A fixed wide magnetic head in contact with the drum and parallel with the drum's axis reads out the developing summation.

Since the evoked potentials are time locked to the drum's rotation, whereas the background activity is not, the summation will emphasize the former. The M.D.A.R.C. can be converted to multichannel computation by the addition of read-in and read-out heads. And the instrument can be applied to very low frequency studies by the addition of a module system. . . (Abstracted from a paper given at the 1961 International Conference on Medical Electronics and Annual Conference on Electrical Techniques in Medicine and Biology)

New B/A Gamma Spectrometer —

luxury features in a compact, economy package



Model 8250 Spectrometer incorporating the All-Electronic Scaler Model 135, the Model 250 Amplifier-Analyzer and Model F-8 Fan Filter Assembly.

Baird-Atomic announces the new Model 8250 single channel Spectrometer which can be quickly and easily calibrated in energy units (Mev) for any energy range from X-rays to cosmic rays. Spectra can be positioned as desired by the high voltage and the gain controls. Any degree of differential operation (relative window width) or integral operation may be obtained.

The Model 8250 is a combination of two instruments just added to the Baird-Atomic line. They are the Model 250 Amplifier-Analyzer and a new all-electronic Model 135 Scaler. The Scaler, which combines a 5 decade, 5 micro-second scaler and an electronic timer on one chassis, is excellent for both general lab counting

work and for use with the most sophisticated automatic sample changing systems.

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Engineering for the Patient

A UNIQUE COOPERATIVE union between medicine and engineering has been established in a series of research projects conducted jointly by doctors from Highland View Hospital and professors from Case Institute of Technology. These projects were initiated by the original grants from the Ford Foundation, which set up the Engineering Design Center at Case, and continued by major grants from the Office of Vocational Rehabilitation and Welfare, of the Department of Health, Education and Welfare. The medical problems under study are essentially those associated with chronic disease such as the nerve and muscle damage resulting from strokes and accidents, and the care of patients who are bedridden. The clinical and research organization of Highland View Hospital, one of the largest hospitals devoted to the treatment of chronic disease in the United States, will combine with the technical facilities of Case.

Control of Joint Movement

In the Engineering Design Center, under the direction of its head, Professor James Reswick, one major project is an attempt to program an artificial arm splint which may allow a paralyzed patient or an amputee to perform such simple actions as eating. A series of splints, attached to a chair or wheelchair, will have devices for measuring the amount of movements in the joints and a control system to control the sequence of these movements.

To program the movement of the splints, the normal person will place his arm within the splints and perform one of a series of tasks. The record of the angle change in the joints as he performs these tests will be recorded on one of the channels of a multi-channel magnetic tape, thus leaving a record of the complete pattern of movement. When this record is played back, the arm splint itself will perform these same movements. The program will also concern itself with the problem of the psychological effect of such a device on the user.

The construction of the device is made possible through the cooperation of the Numerical Controls Division at Case under the direction of Associate Professor Harry W. Mergler. Doctors Peszczynski and Long of Highland View will participate in this project along with Jan Bruell, Associate Professor of Psychology at Western Reserve University.

Muscles by Radio

The second project in the Engineering Design Center concerns the development of a minute wireless unit which may be implanted in a muscle and supplant the present wired techniques of measuring the electricity developed by muscle. This unit will transmit muscle behavior by radio waves. First implanted in animal muscle tissue for long periods of time, it will be powered either by the electricity produced by the muscles themselves or from an external radio source. Eventually it is hoped that by external radio controls the muscle may be activated.

W. H. Ko, of the Case Staff, who has developed miniature FM broadcasting units with tunnel diodes, and Dr. Long and Dr. J. G. Furey, Chief of the Department of Orthopedics and Assistant Clinical Professor of Orthopedic Surgery at Western Reserve University Medical School, will participate in these studies.

Controlling Pressure on the Body

The third major project in the Design Center is the measurement and control of pressure applied to the body. Body weight, clothing, orthopedic appliances, etc., exert a continuous pressure on the human body. If this pressure is large enough and continues for a long enough time, it will result in damage to the body tissues. Such a factor contributes to the development of bedsores in a patient who is immobilized in bed for extended periods. Dr. Olgierd Lindan will serve as a consultant on this project. The Case engineers hope to develop a means by which the constant changing pattern of pres-

ures on the body as it moves in bed may be recorded for medical study.

Artificial Muscle

The fourth project is the development of an artificial muscle. A plastic tube made up of a chain of spheres so that it can be shaped around the outside of a limb will be tested. These spheres may be inflated with air in order to make the artificial exterior muscle contract and move the limb. Other methods of actuating artificial muscles will also be tested in the effort to develop muscles which are light in weight and inexpensive to fabricate.

Electrogoniometer

A series of undergraduate student projects also is currently underway at Case. Each student receives regular course credit for his project. One of these projects is an *electrogoniometer*, a device which can be attached to a joint, such as the finger, to record electrically the degree of bending that exists in the finger or joint. Up to now, doctors have attempted to discover the relationships between the electrical activity of muscles and the degree of bending of a joint through the use of motion pictures which had to be scanned, frame by frame. This new device permits an automatic recording of the degree of bending of the finger.

Hoyer Lift

A second undergraduate project is the redesign of a Hoyer Lift in order to make it more useful for moving paralyzed patients in and out of beds and wheelchairs. The new design incorporates a yoke which remains more or less rigid, and the lift itself is low enough that the patient can be readily moved in and out of an automobile.

Body Pressure

Another current undergraduate project is the construction of a device to maintain constant pressure on a limb, such as the leg. This is part of the larger project concerned with the ways in which pressure is maintained on the body, and which eventually hopes to understand internal pressure inside the body.

Electronic Control Aids Heart Research

Researchers at the University of Oregon Medical School are using electronic equipment to help diagnose conditions that might require open-heart surgery. Dr. Charles Dotter, chairman, Department of Radiology said the new technique has been of value in pinpointing such cardiac conditions as ventricular septal defects and faulty valvular closure.

The radiographic study of contrast fluids in the cardiovascular system includes X-ray motion pictures of the heart. New filming techniques promise use of smaller quantities of contrast media (radio-opaque fluids injected into blood vessels to make the blood stream visible in X-ray films). Two methods—high-speed cine-fluorography and the summed-image technique—give doctors a "slow-motion" look at the beating heart. The studies have revealed that blood velocities and volumes are actually much higher than had been indicated by conventional equipment.

In high-speed cine-fluorography, a high-speed movie camera is synchronized with an X-ray machine^{1, 2} so that the X-ray flash occurs when the camera shutter is wide open. A subminiature magnetic pickup³ is mounted close to the camera's rotating prism-style shutter and produces an output voltage spike which is fed through an appropriate delay circuit to fire the X-ray tube while the shutter of the camera is wide open. A Multipulser⁴ allows for appropriate delay settings at exposure rates of up to 5,000 frames a second. The Multipulser triggers the Dynapulse unit⁵ that closes the secondary high-tension X-ray circuit. X-rays pass through the patient and into the image intensifier,⁶ the output of which is focused on the film in the high-speed camera.⁷ One or more pulses of one-half millisecond duration appears to be suitable for line-radiography at relatively high framing rates.

Emphasis has shifted from the high-speed cine-fluorography field to that of multiple exposure on one large sheet of X-ray film because the summed-image radiographic technique provides easier access to more accurate and meaningful data in a study of contrast fluids in the cardiovascular system. Using a grid-operated switching tube connected in series with a diagnostic X-ray tube, it is possible to obtain multiple short pulses of X-ray energy. By recording two or more of these on a single radiographic film, it is possible to record the interpulse spacial displacement of moving radiopaque objects and, therefore, to calculate their velocity. In order that each exposure pulse be made, it is necessary to feed a control signal to the grid of the switching tube. For biological purposes it is also necessary that the interval between succeeding pulses be predetermined and that a suitable range of intervals be available. The Multipulser provides the desired burst of two or more precisely spaced control signals and relates these to the heart beat of the patient or animal under study. Serial filming techniques permit sequential observations. The technique should find important clinical usage when a satisfactory particular contrast medium is developed suitable for injection into man's blood vessels.

References

1. X-ray unit by Pickering & Co., Inc., Sunnyside Blvd., Plainview, N. Y.
CIRCLE 38 ON READER-SERVICE CARD
2. X-ray control and high voltage transformer by Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.
CIRCLE 39 ON READER-SERVICE CARD
3. Magnetic pickup by Electro Products Labs., 4501 N. Ravenswood Ave., Chicago 40, Ill.
CIRCLE 40 ON READER-SERVICE CARD

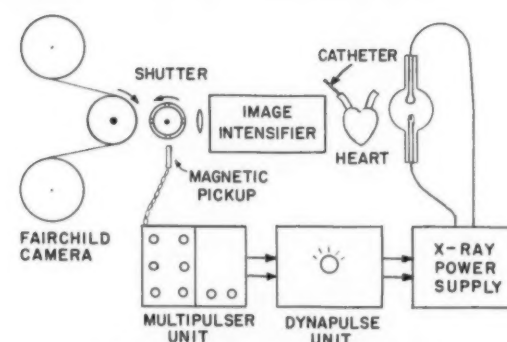


FIG. 1. SCHEMATIC OF SYSTEM.

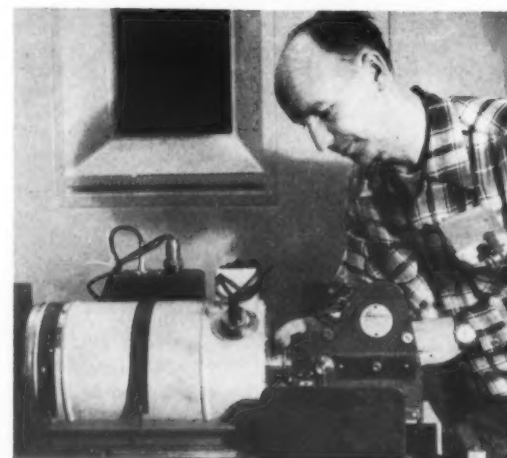


FIG. 2. ENGINEER SETS up synchronized camera and X-ray equipment.

4. Multipulser by Electro-Glass Laboratory, 4000 S.W. 114 St., Beaverton, Oregon.
CIRCLE 41 ON READER-SERVICE CARD
5. Dynapulse (Trade Name) by Machlett Laboratories, Inc., 1063 Hope St., Springfield, Conn.
CIRCLE 42 ON READER-SERVICE CARD
6. Image intensifier by Phillips, Eindhoven, Holland.
CIRCLE 43 ON READER-SERVICE CARD
7. High-speed camera by Fairchild Camera and Instrument Corp., Industrial Products Div., 580 Midland Ave., Yonkers, N. Y.
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6	21	36	51	66	81	96	111	126	141	156	171	186	201	216	231	246	261	276
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8	23	38	53	68	83	98	113	128	143	158	173	188	203	218	233	248	263	278
9	24	39	54	69	84	99	114	129	144	159	174	189	204	219	234	249	264	279
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11	26	41	56	71	86	101	116	131	146	161	176	191	206	221	236	251	266	281
12	27	42	57	72	87	102	117	132	147	162	177	192	207	222	237	252	267	282
13	28	43	58	73	88	103	118	133	148	163	178	193	208	223	238	253	268	283
14	29	44	59	74	89	104	119	134	149	164	179	194	209	224	239	254	269	284
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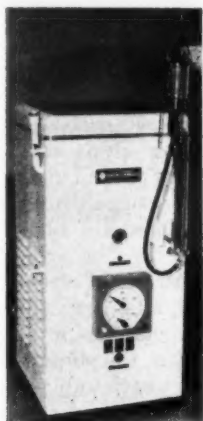


BRIEFS

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Hypothermia Slows Physiological/Pathological Clock

Hypothermia, or the removal of heat from the body, has become an important technique for use with extracorporeal circulation, in conjunction with the heart-lung pump. Without the use of cooling, the human blood flow can be stopped for only seven minutes, a severe handicap on the surgeon attempting to perform heart repair. The



decreased need of oxygen, combined with the increase in the rate of solubility of oxygen and carbon dioxide at low temperatures (this rate jumps more than 50% at 20°C, 68°F) extends the time period sufficiently so that complicated heart operations are possible.

Hypothermic anesthesia, which approaches the so-called state of hibernation, takes place at 28°C (82.4°F). At this point it becomes a great asset in the treatment of pain, severe burns, the toxemia of pregnancy, psychosis and cancer. It lessens the need for anesthesia, and by preventing shock and reducing stress response, it is ideal for use with poor operative risk patients, in support of a failing heart, and in the prevention of gastric hemorrhage.

The Cincinnati Sub-Zero Products TF Converter eliminates most of the previous difficulties associated with extra corporeal circulation. A constant cooling rate is assured and the warming cycle is always in readiness. In operation, pressure is reduced by means of an expansion valve, which permits the liquid refrigerant to vaporize. The lower pressure changes the boiling point to a level which is in direct proportion. By compressing heat-laden refrigerant returning from the evaporator, the pressure and boiling point are raised, and this concentrates the heat for effective dissipation through radiation from the condenser assembly. The temperatures are electronically controlled and are indicated to the surgeon. It is a simple plug-in unit and requires a minimum of attention.

The experimental work on this machine was done by Cincinnati SubZero Products under the auspices of the Max Gottesman Foundation, a privately endowed organization dedicated to the development of simplified techniques for heart surgery.

Hypothermia slows down the minute hand of the physiological clock. The additional time it affords allows the cardiovascular surgeon to correct defects or repair lesions. It may also slow down the pathological clock and give the physician time to support healing in a disease process.

Cincinnati Sub-Zero Products is located at 3930 Reading Rd., Cincinnati 29, Ohio.

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Measuring Skin Resistance

The YSI Model 22A Dermohmmeter, developed in cooperation with the Fels Research Institute, Yellow Springs, Ohio, provides a continuous record of skin resistance over the entire range from zero to 500,000 ohms, in as many as 100 or as few as five automatically-switched increments. The skin resistance record can be made concurrently with the experimenter's choice of numerous other measurable quantities and stimuli . . . for advanced studies of the autonomic nervous system in psychophysiology, medicine, psychology.

Since the measurement of minute changes in skin resistance is often desired at various points over the wide range of possible skin resistance "levels," this instrument is designed with a 6,000-ohm full scale maximum sensitivity. The unique feature of automatic range-changing allows the instrument to function with this sensitivity over its entire 0-500,000 ohm range . . . Instrument switches automatically from one sub-range to another so as to follow subject's resistance over entire 0-500,000 range with constant, maximum 6,000 ohm full scale sensitivity if desired . . . (From new bulletin, Yellow Springs Instrument Co., Inc., Box 106, Yellow Springs, Ohio.)

FOR THIS LITERATURE CIRCLE 46 ON READER-SERVICE CARD

PRODUCTS

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BLOOD pH MONITOR

New pH Electrode measures acidity level in blood stream continuously for up to 6 hours without use of anti-co-



agulants. Device incorporates two electrodes within standard hypodermic needle and syringe; can be used to determine carbon dioxide in blood stream of patient receiving anesthetic, provide early warning of approaching shock condition in accident victims, indicate whether iron lung patient is receiving sufficient oxygen.—Minneapolis Honeywell Regulator Co., Heiland Div., 5200 E. Evans Ave., Denver 22, Colo.

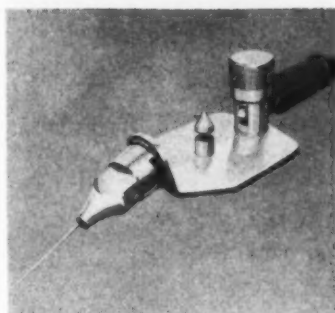
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FILM BADGE SERVICE

Film badge service features current, cumulative quarterly and yearly radiation exposure report plus "running lifetime" exposure totals. Coded film badges (pat. pend.) assure positive identification of film; metal absorbers are riveted in place. Accurate readings as low as 5 mr despite extreme temp and humidity.—Nucleonic Corp. of America, 196 DeGraw St., Brooklyn 31, N. Y.

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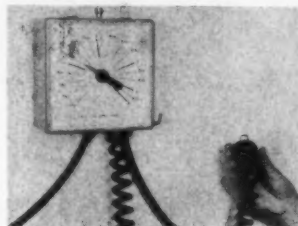
SUBCUTANEOUS NEEDLE ELECTRODE



New silver-coated Dermatrode has standard plate contact with adaptor that permits use of sterile hypodermic needle as subcutaneous contact. It allows plate contact during anesthetic induction; needle is inserted when patient is asleep, makes optimum contact, eliminates skin resistance and problem of paste drying during surgery. For use in animal research laboratories and for instantaneous and prolonged use with cardiac pacemakers.—Starling Corp., 2047 Sawtelle Blvd., Los Angeles 25, Calif.

CIRCLE 49 ON READER-SERVICE CARD

X-RAY TIMER



New Model 1400 Electronic Timer replaces mechanical timer, converts X-ray machine for faster and safer techniques. Features: precise control of film density, automatic resetting, safe operating distance (to 15'), longer tube life.—Electronic Control Corp., 15341 Dale, Detroit 23, Mich.

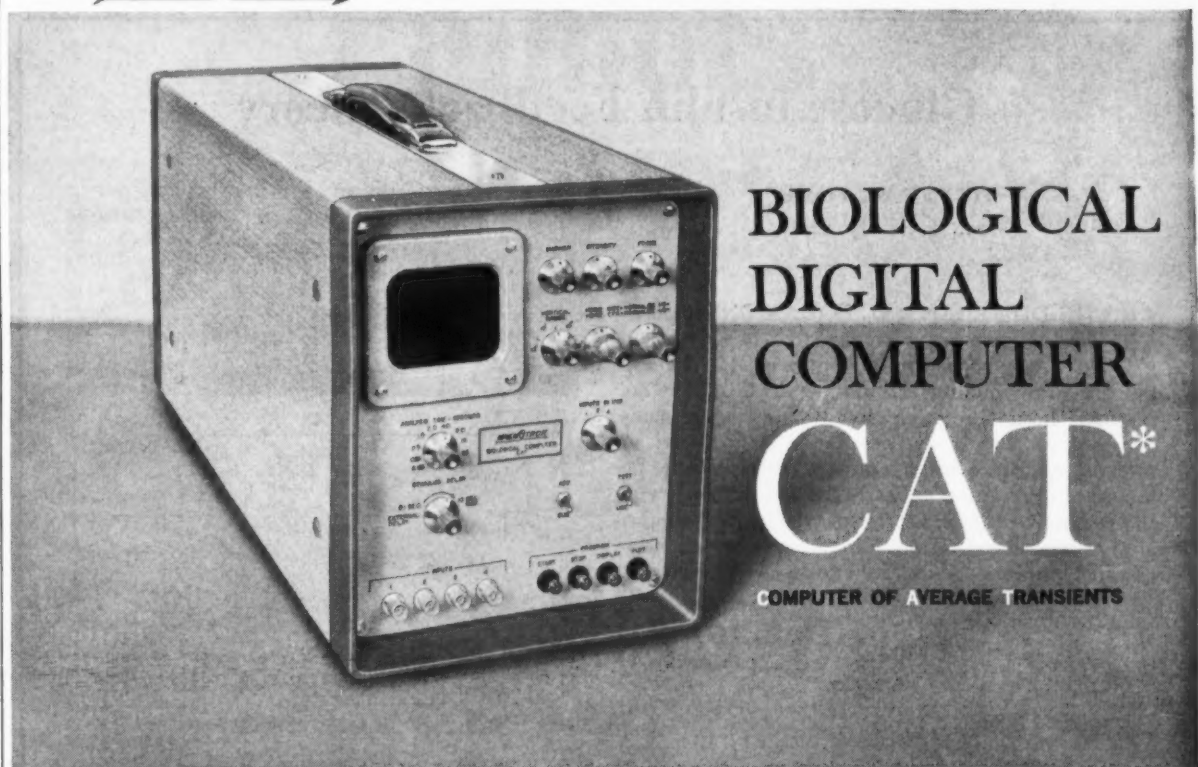
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MEDICAL TV

New 4-lb Model 500 Head Camera (in use at Northwestern University, Chicago Branch, to illustrate lectures on techniques of performing ear, nose and throat operations) enables students to see what is being lectured about. Combined with Model 500 Utiliscope closed circuit TV system, it utilizes vidicon-type camera pickup tube and operates satisfactorily with as little as 5 foot candles illumination.—Diamond Electronics, Div. Diamond Power Specialty Corp., Lancaster, Ohio.

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FROM MNEMON TRON LEADERS IN BIOLOGICAL DATA PROCESSING



BIOLOGICAL DIGITAL COMPUTER CAT*

COMPUTER OF AVERAGE TRANSIENTS

for simultaneous, on-line calculation of average evoked responses of several variables

The CAT Mnemotron BIOLOGICAL DIGITAL ON-LINE COMPUTER is a flexible small digital computer for the study of biological and other variables, where response information is to be extracted from noise.

Biological responses to stimuli are generally masked by variability produced by other factors. The CAT digital computer is able to extract the precise response pattern from the "noise" even when that noise may be tens of times larger than the response itself.

The CAT computer calculates the average response to repeated events and can do this simultaneously for four different variables. It is thus ideal for the simultaneous observation of average evoked brain potentials from four different regions of the brain, also for averaging nerve potentials, retinograms, cardiographic data, phonocardiograms, autonomic functions, pupil responses and many other biologic variables, as well as seismographic data.

The averaging is carried out "on-line," that is to say, the computer calculates the data as they occur. At the end of an experimental run the average responses are already computed. The averages may be observed during any part of the experimental run on a visual oscilloscope display.

The average responses are calculated for 400 ordinates which may be spaced at intervals selected from a very wide range. The data may be scanned for the entire 400 ordinates in times ranging from 62.5 milliseconds to 64 seconds selectable by multiples of 2.

The computer brings the flexibility and accuracy of the digital computer to the biological scientist while maintaining the essential simplicity of a laboratory instrument.

Graphic readout is provided for stripchart and XY recorders. The computer needs no card, punches, or other auxiliary equipment. Its simple controls can be operated without special training. It connects directly with standard electroencephalogram recorders or other data preamplifiers.

The CAT computer with its small portable size and weight of only 30 pounds, contains hundreds of transistors, and a ferrite core memory, yet requires no special maintenance. It is a powerful tool for the biological scientist for the efficient study of the behavior of the many variables of the living organism.

A natural method of using the computer is also in conjunction with our precision analog tape recorder systems which makes it possible to increase the number of independent inputs and carry out repeated analyses of different time aspects of the same data.

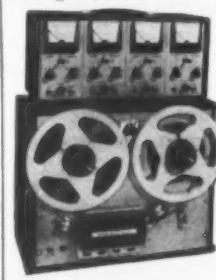
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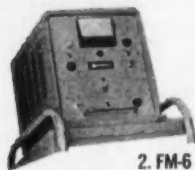
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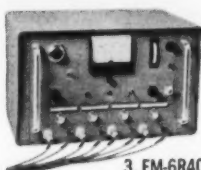
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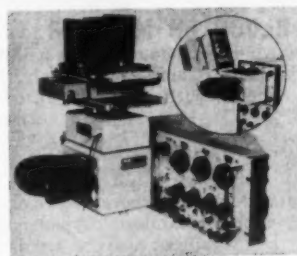
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CIRCLE 121 ON READER-SERVICE CARD

OSCILLOSCOPE CAMERAS



Five new Oscilloscope Cameras include Type 3005 with F/4.5 lens, which uses high-speed Polaroid roll film; and Types 3006, 3007, 3008, 3009, which incorporate 4" x 5" holder for Polaroid cut film. Types 3006 and 3007 cameras have F/1.9 flat field and F/4.5 lenses, respectively; Types 3008 and 3009 include new data chamber for imaging data directly on film, rather than focusing through main lens and shutter. New accessories include new Type 3671 Carry Case, Type 3730 Electric-Shutter Actuator, and Type 3683 Lensette (adapts camera for close-up shots of instrumental panels, schematics, etc.).—Analab Instrument Corp., 30 Canfield Rd., Cedar Grove, N. J.

CIRCLE 102 ON READER-SERVICE CARD

Digital Computing of Electrocardiographic Data

With a general purpose computer, the researcher, the statistician and the diagnostician can make an almost infinite variety of measurements and analyses by writing a new set of instructions for the machine for each study. The advantages of such an approach in cardiology and neurology are obvious, once the feasibility of the approach is established.

To evaluate this feasibility, a group of researchers* of the Veterans Administration chose the electrocardiogram for a pilot study in automatic data processing. This type of record was particularly apt for the test because high-speed analysis of thousands of such charts has important clinical diagnostic applications and because electrical signals from the heart are repetitive and well adapted for objective mathematical treatment.

Basic to mass treatment of electrocardiograms is the conversion of electrical heart signals to numbers and the storage of these numbers in a form acceptable to the computer. . . First, the outputs from these electrocardiograph leads for each patient were simultaneously FM-recorded on three tracks of an Ampex FR-104 magnetic tape recorder. (The validity of the three leads to accurately represent the spatial electrical field of the heart has been proven by the work of Otto H. Schmitt and Ernest Frank.) The fourth track received such verbal information as patient identification, and approximately 20 cardiac cycles from each of about 100 patients were captured on each reel of analog tape.

These data were then transformed from analog to digital form by a technician using the equipment shown (Fig. 1). By means of the play-back mode of the analog recorder, the three heart signals were retrieved from the tape as voltages and checked on an oscilloscope for acceptability. The remainder of the process, once started by the operator, was completely automatic.

First, the control unit put the digital tape transport into motion, and, after the tape achieved proper speed, started the format control. This latter component, by controlling the analog switch, caused sampling of each of the three leads (X, Y and Z in Fig. 2) 1,000 times per second and also started the analog-to-digital converter. The converter changed the analog voltages to binary digits represented by sets of pulses, and fed these pulses to a buffer for amplification and feedback to the format control unit. This latter unit then delivered them serially to the digital "write" head which recorded them on digital magnetic tape. At the end of a cardiac cycle, the control unit stopped the conversion equipment so it was ready for the next patient's record. Records of one cardiac cycle for each of approximately 1000 patients were accommodated on a reel of digital tape.

Obviously, a good test for the automatic equipment was the conformity between the original records on analog tape and graphs of the three processed electrocardiograph leads based on the digital print-out received from the computer. The similarity between the analog record (Fig. 4) and the charts (Fig. 3) made from the digital readout shows that the pilot system for conversion and storage of cardiological data performed reliably. . . (From 36-page Readout (April-May 1961), Ampex Data Products Co., Box 5000, Redwood City, Calif.)

*Hubert V. Pipberger, M.D.; Alan Berson, B.E.E.; F. W. Stallman, D.Sc.; Leonard Taback, B.E.E.

Glucose-Insulin Feedback Theory

VICTOR W. BOLIE
Iowa State University

THE DIFFERENTIAL EQUATIONS of feedback regulatory systems have been applied to the glucose-insulin problem, to develop the minimum number of independent parameters required in defining the homeostatic mechanisms involved in glucose and insulin tolerance tests. A method of representing glucose homeostasis by means of differential equations was developed, and the restrictive conditions under which the formulas apply enumerated. The minimum number of independent parameters required to define the results

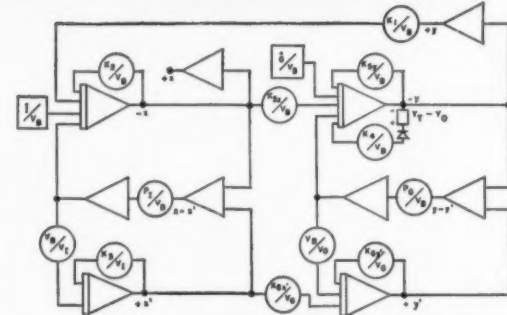
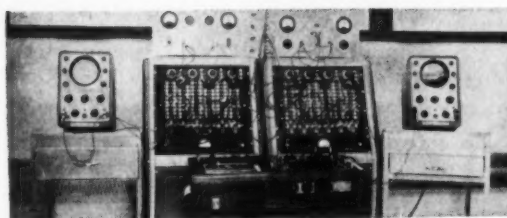


FIG. 1. ANALOG COMPUTER setup and circuit used to implement glucose insulin feed-back formulas developed in original paper.

of the glucose and insulin tolerance tests is found to be seventeen.

The simplified equations developed are convenient for solution with an electronic analog computer, using 10 operational amplifiers (Fig. 1). Preliminary computer experiments with various potentiometer settings were made to simulate the well-known curves of the glucose and insulin tolerance tests. The computer time-scale was such that one second of computer time simulated one hour of real time. The results of the computer experiments yielded the curves shown in Figs. 2 and 3.

It can be shown by the feedback equations that any attempt to attribute blood-glucose regulation solely to the liver will be incompatible with the frequently-observed overshoot in the glucose tolerance test, despite the known rapid response of the liver to hyperglycemia.

The theoretical approach is not limited to the particular restricted problem considered. The theory can be extended to accommodate the effects of the other endocrine glands. The theory itself also can be applied to any other regulatory process, such as thermoregulation, erythropoiesis production of red blood cells, and electrolyte homeostasis.

Abstracted from a paper presented at the Third International Conference on Medical Electronics, London, England, July 22-27, 1960.

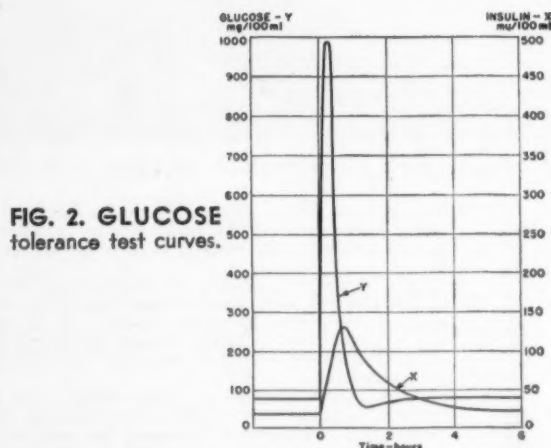


FIG. 2. GLUCOSE tolerance test curves.

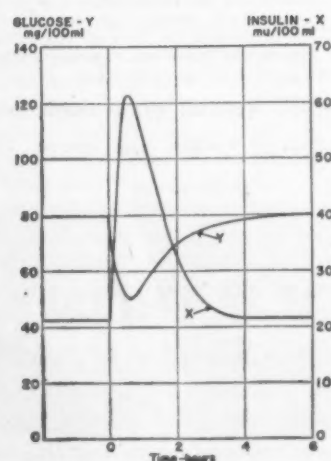


FIG. 3. INSULIN tolerance test curves.



FIG. 1. The analog-to-digital equipment. The control unit and oscilloscope are third from left, analog recorder at left, digital tape handler at right. The other equipment diagrammed in Fig. 2 is in the cabinet.

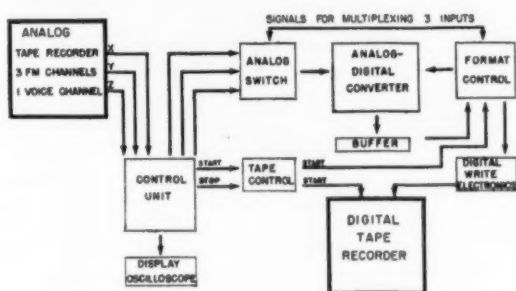


FIG. 2. Block diagram of the equipment.

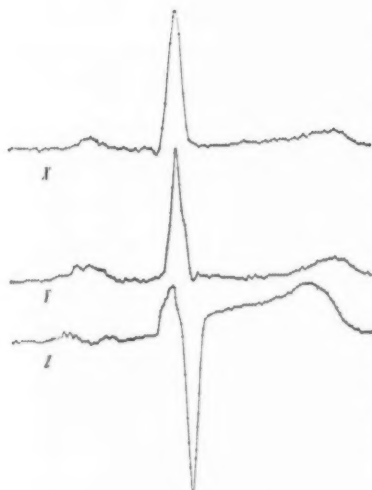


FIG. 3. Record shown in Fig. 4 after processing through conversion equipment and digital computer. The tracing was printed out in numerical form and replotted on the basis of this digital information. Amplitudes, wave forms and time relationships were maintained satisfactorily. This time-scale is expanded more than that of Fig. 4.

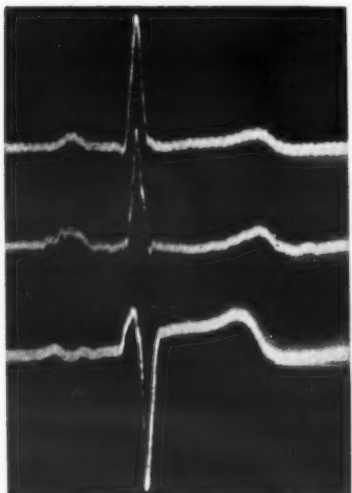


FIG. 4. Sample records of three electrocardiographic leads (X, Y and Z, from top to bottom) replayed from the analog magnetic tape and photographed from the oscilloscope screen.

We have been swamped by requests to be added to the mailing list of MEN. It has just not been possible to handle all these requests before this issue went to press. We therefore ask prospective readers to bear with us.

PRODUCTS

FOR MORE DATA, CIRCLE PERTINENT NUMBER ON CARD.

SELF-STICKING LABEL



New MC-L Labelon is pressure-sensitive matte material that can be written or typed upon, then covered with an attached clear layer of special type Mylar plastic for permanent protection. Labels resist temps from -100° to 300°F ; have black, blue, red or green borders for identification; are conveniently packaged in small tray-type boxes. Sizes from $\frac{1}{2} \times 1\frac{1}{4}$ " to $2 \times 3\frac{1}{4}$ ". Details, prices and samples available.—Labelon Tape Co., Div. Labelon Corp., 10 Chapin St., Canandaigua, N. Y.

CIRCLE 52 ON READER-SERVICE CARD

COMPUTING AUDIOMETER



New Inductive Decision Audiometer (IDA) combines standard audiometer, typewriter modified for audiological use, and computing system. It can be programmed to follow standard audiometric procedures or any variation in techniques desired. IDA varies frequency and gain of pure tone signals in graduated steps. Tone impulses emitted at irregular intervals avoid response to rhythm pattern. Computing audiometer remembers subject's responses and makes audiological decisions, eliminates possibility of human error, automatically rechecks.—Belton Hearing Aid Co., 2900 W. 36 St., Chicago, Ill.

CIRCLE 53 ON READER-SERVICE CARD

PORTABLE SURVEY METER



New 33-lb Model 15-2 nuclear radiation Survey Meter, for rapid low-level background monitoring, easy field survey from moving vehicle, or swift location of contaminated material, uses ultra-sensitive spherical 7"-dia plastic scintillator covered with 20 mg/cm² absorbing material which has uniform omnidirectional detection pattern. (Special detection patterns available.) Sensitivity of 20,000 cpm above 0.15 Mev gamma radiation at sea level, 65,000 cpm above pulse level of 0.1 Mev in radiation field of 0.04 mr/hr produced by Co 60. Five-range selector switch gives range from 0 to 1,000 up to 0 to 10,000,000 cpm with meter accuracy of $\pm 2\%$.—Franklin Systems, Box 3250, West Palm Beach, Fla.

CIRCLE 54 ON READER-SERVICE CARD

almots is not good enough

THE FOXGLOVE SYSTEM IS THE NEWEST CONCEPT IN PRESENTATION AND RECORDING OF SCIENTIFIC INFORMATION

FOXGLOVE is a physiological monitor that provides the data in easily read numbers and on an automatically plotted record, as well as in a permanent wave form recording and monitorscope display. By avoiding the need for interpretation, errors are virtually eliminated.

It gives the physician and scientist accurate and complete information in numbers CONTINUOUSLY and in standard wave form displays. In the operating room, where time is so important, respiration, heart rate, blood pressure, and other data can be read instantly from the display panel. No interpretation is required. In the recovery room... intensive therapy ward... research laboratory... space medicine, a wide variety of models is available to serve a variety of needs:

- Single or multiple patient units
- Mobile or permanent installations
- Computer inputs and telemetering

FOXGLOVE is versatile... Plug-ins and transducers are available for a wide variety of measurements, including temperature, blood pressure, heart rate, respiration rate, cardiac output, skin resistance, medication flow, urine output, oxygen saturations, carbon dioxide level, etc.

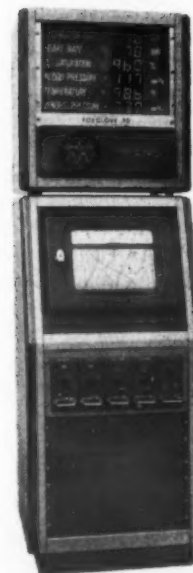
FOXGLOVE is economical... can cost less than most of the less advanced recording systems in current use. Saves time for nurses and technicians to perform other duties. You get more information — more accurately — at less cost.

Write for your copy of the brochure describing the applications of the FOXGLOVE System and further details.

STARLING CORPORATION

2047 SAWTELLE BOULEVARD, LOS ANGELES 25, CALIFORNIA, U.S.A. • BRADSHAW 2-7131

ASPERA AD ASTRA



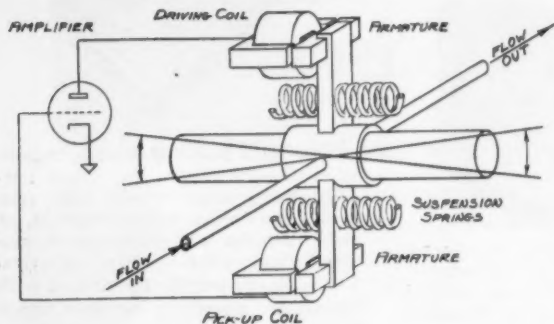
- Data instantly accessible
- No knobs or controls necessary for most procedures
- Features 4 methods of readout
 - Numerical values
 - Plotted chart
 - Oscilloscope
 - Oscillograph



CIRCLE 7 ON READER-SERVICE CARD

Density Measurement

The Densitor provides an entirely new, unique electromechanical method of continuously measuring density by use of a vibrating tube measuring element. This measuring element is insensitive to attitude and is not affected by flow velocity, viscosity, pressure, or temperature.



perature.

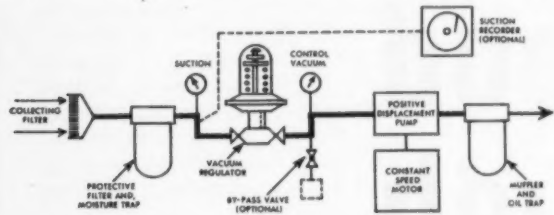
The measuring tube is supported by a spring suspension. It is connected by two flow lines to the source of the material to be measured, so that the tube continuously samples the product. By means of an electromagnet, a sensing coil and an electronic amplifier, the tube is caused to vibrate at a natural frequency which is the function of the total mass and the spring rate of the suspension.

The resonant frequency is therefore proportional to the density of the material in the measuring tube. An electronic frequency meter converts the resonant frequency to a meter reading and/or the electrical input of the commercially available recorder or controller . . . (From 4-page bulletin, Co-Engineering Co., Boonton, N. J.)

FOR THIS LITERATURE CIRCLE 55 ON READER-SERVICE CARD

Automatic Air Sampling

Accurate interpretation of air sampling data depends (a) upon knowing how much air the sample came from, and (b) on obtaining a true time average of the changing concentrations of contaminants in the air during the test . . . The Model 2-AP Constant Flow Air Sampler is a suction source designed to automatically control the flow



of air entering the sampling equipment or filter to which it is connected. It is easily set for any flow within its operating range, and will hold the flow at that value even though filters become dirty, extension hoses are added, or different collectors are used . . . The Model 2-AP consists basically of a rotary vacuum pump, a constant speed motor, and a vacuum regulator. A Hansen coupling is provided on the inlet for attaching filter holders, extension hoses, etc. A protective filter and moisture trap, located between the Hansen coupling and the regulator, prevents foreign matter from reaching the regulator and pump. Vacuum gauges located adjacent to the regulator show the suction on the collector and the control setting or "control point." An efficient muffler and oil trap on the exhaust side of the pump reduces exhaust noise, and effectively stops any oil discharge . . . (From Technical Bulletin, Schmidt Instrument Co., Box 111, San Carlos, Calif.)

FOR THIS LITERATURE CIRCLE 56 ON READER-SERVICE CARD

Electronic Cauterization

New Electro-Coagulation Generator for instant bipolar cauterization of bleeding vessels without burning adjacent tissue saves as much as 40 minutes in open heart surgery. Self-activating switch is built into inside surfaces of bipolar forceps. Slight additional pressure to forceps after bleeder has been grasped activates generator. Where unipolar cauterization is necessary, generator changes to unipolar mode by depressing foot switch. Generator panel has simple on-off switch and two signal lights. Up to 100-watt output is available. With bipolar cauterization, decreased amount of power is required for satisfactory operation.—Medtronic, Inc., 3055 Highway 8, Minneapolis 18, Minn.

FOR THIS LITERATURE CIRCLE 57 ON READER-SERVICE CARD

KUBICEK Continued

C. To design and develop complex instruments not commercially available.

It is planned that this Center would function in the areas outlined above with the main emphasis on providing advanced and complex instruments that are either not commercially available or that would be extremely difficult for an individual investigator to obtain and operate. Many of the great achievements in the progress of science and medicine have been obtained with instruments not adaptable for commercial production due to limited demand or other economic problems.

Instruments developed by this Center would be of use in many fields of human endeavor. Examples of these applications would be in the area of space exploration, aviation medicine, veterinary medicine, agricultural research, and others. Direction of the activities of this Center would be by highly trained individuals at the Ph.D. level in engineering, physics, chemistry and related sciences.

Training Medical Engineers

One of the critical problems facing the nation today is the shortage of technically trained personnel (engineers, physicists and chemists) who are also trained in the fields of biology and medicine. The gap between these technological fields is difficult to overcome in the areas of bio-medical instrumentation. One of the important functions of the proposed Instrumentation Center would be to provide the facilities and teaching staff necessary to provide training for individuals educated in technical fields other than biology and medicine in the various aspects of bio-medical instrumentation. For example, an electrical engineer could receive training in fields such as anatomy, physiology, bio-chemistry, etc. along with his training in the direct application of electrical engineering to bio-chemical instrumentation.

Industry Cannot Do It

Due to the relatively small demand for medical instruments, industry cannot or will not develop many of the instruments so badly needed. One example illustrates the problem:

Despite the many millions of dollars expended for heart research and the efforts by scientists all over the world to improve the treatment of heart disease, there is no method available today to provide the physician with a continuous record of cardiac output. Expensive, complicated, and inconvenient methods do exist for a few physicians fortunate enough to have a large hospital laboratory available. The data that they can obtain from these methods is limited and grossly inaccurate. It appears to be within the scope of electronics to develop a convenient and rapid method, adaptable to any physician's office procedures, to measure the amount of blood pumped by the heart.

Development of such a device will be a complex research program utilizing electrical engineers, physiologists, and mathematicians. The financial return to commercial companies probably would not be great enough to warrant expenditure of the development funds needed for such a project.

Currently available electronic instruments can provide continuous records of pulse rate and blood pressure. In evaluating the cardiac patient for ability to return to his job or to his previous environment the physician needs to know the response of the heart to exercise. The ability

TABLE 2—BUDGET REQUIREMENTS FOR MEDICAL INSTRUMENTATION CENTER

Item	First year	Second year	Third year
Building	\$ 700,000.	—	—
Equipment	\$ 525,000.	\$225,000.	\$ 50,000.
Salaries	\$ 155,000.	\$185,000.	\$195,000.
Salaries and Expense	\$ 95,000.	\$ 95,000.	\$105,000.
Overhead	\$ 25,000.	\$ 30,000.	\$ 35,000.
TOTALS	\$1,500,000.	\$535,000.	\$285,000.

of the heart to pump additional amounts of blood during exercise is the one vital measurement that the average physician cannot make today. The inability of the physician to accurately judge the ability of the heart to pump blood under exercise conditions constitutes a hazard to all cardiac patients.

Many such developments are needed in the biological and medical fields; and an instrumentation center of the scope and caliber outlined could develop them.

A few attempts have been made to establish some form of a medical instrumentation center. No complete facility exists today for this purpose. The Medical Electronics Center of the Rockefeller Institute, New York, seeks to advance the application of electronic techniques in the life sciences and medicine through conferences on specialized topics, by publication of the *Bibliography of Medical Electronics*, and by acting as a clearing house of ideas and facilities in the field of medical electronics. The function of this Medical Electronics Center is limited primarily to the field of transmission of information and ideas between the scientists working in this field. It does not attempt to provide the larger needs of training personnel and development of instruments unavailable at present.

Industrial organizations have also become concerned with the limitations of medical instrumentation. In a recent article on this subject, Dr. V. K. Zworykin, RCA laboratories, Princeton, New Jersey⁴ has outlined in fairly complete form the needs for a Medical Engineering Research Institute. In a summary statement Dr. Zworykin states, "A much greater effort is needed to realize the potentiality of electronics in medicine. An important step forward, in overcoming some of the major obstacles to progress, would be the creation of one or several Medical Engineering Institutes, having the specific object of facilitating the development, initial production, and clinical testing of apparatus for medical research, and practice, and serving at the same time as a training center in the boundary field of medical electronics."

Doctor Zworykin also indicated that a precedent for the establishment of the medical engineering institutes exists today in the successful *Institute of Experimental Surgical Apparatus* functioning in the Soviet Union. Recent exhibits of its work, at the Brussels World's Fair and elsewhere, have given impressive evidence of the substantial and useful results that can be achieved through a concerted effort in applied medical engineering. According to the Zworykin report, proposals essentially similar in nature and with provision for education in medical engineering have also been made in many parts of the country, notably at the *Drexel Institute of Technology*, Philadelphia, (Dr. E. LeCrissepte), *Columbia University*, New York City, (Dr. H. Zinsser) and *Johns Hopkins University*, Baltimore, (Dr. S. Talbot).

Dr. Zworykin is also of the opinion that a further advantage of such institutes would be to encourage invention and promote the exchange of ideas of experience, generating an

even greater flow of new devices, systems, and techniques. Thus, the institutes would fill a definite and alarming gap in the pattern of medical practice in the United States today.

Existing Facilities in the University of Minnesota

The main campus at the University of Minnesota is one of the largest single units of this type in the world. The University Medical School lies on one side of the campus and within a few blocks distance is the Institute of Technology with its departments of engineering, physics, and chemistry. Also a large library is available for the Institute of Technology and a separate library for the School of Medicine. A new building presently in the planning stage to house expanded activities of the Department of Physical Medicine and Rehabilitation will be erected within the next year. As planned, the Medical Instrumentation Center could be added to the new buildings with a minimum of construction costs.

The primary direction and organization of the Instrumentation Center would come from the staff of the Department of Physical Medicine and Rehabilitation. Adequate advisory personnel are available from other departments in the Medical School, as well as the various departments in the Institute of Technology. An advisory committee with representatives from the various disciplines involved would be established for overall direction of the center.

In addition to the existing faculty members at the University the following personnel will be required to establish the instrumentation center during the first year:

A. 3 senior staff members with training in 3 separate fields at the Ph.D. degree level—1 physicist, 1 electrical engineer, 1 physical chemist.

B. 3 junior level graduates in physiology, bio-chemistry and medicine: 1 physiologist, 1 bio-chemist, 1 Doctor of Medicine.

C. 6 Electronics Mechanics.

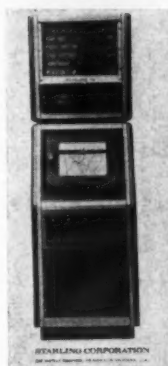
D. Part-time graduate students.

If the development of a Medical Instrumentation Center is to be accomplished in the shortest time possible, it will be necessary for the Congress to appropriate sufficient funds for building construction. Few if any institutions, could accommodate a unit of this size without additional building space. If local matching funds are required, this will either delay development or make it impossible to establish such a center.

References

1. Coordination of federal agencies' programs in bio-medical research and in other scientific areas. Report by the Senate Subcommittee on Reorganization and International Organizations, Report No. 142, 1961.
2. Montgomery, L. H., The origin of the Professional Group on Medical Electronics. *Proc. of the IRE*, vol. 47, page 1813, 1959.
3. Klopsteg, Paul E., Instrumentation in Bio-medical Research. *Proc. of IRE*, vol. 47, page 1999, 1959. Survey prepared for the Biology Council, Division of Biology and Agriculture, Nat'l. Acad. Sciences, Nat'l. Res. Council Wash., 25. D. C.
4. Zworykin, V. K., Medical Electronics Center—Interdisciplinary Coordination. *Proc. of the IRE*, vol. 47, page 2009, 1959.

PHYSIOLOGICAL MONITOR

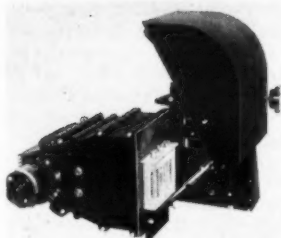


New Foxglove System displays data concisely and in clearly visible numbers, uses modern electronic digital computer techniques. Calibration is automatic; multiple functions are displayed as they occur in numbers on large lighted board. Each channel has 10" wide excursion, its own color symbol. Scale value is already

printed on paper. System also includes monitorscope display and waveform recordings (ECG, EEG, pressure curves, etc.).—Starling Corp., 2047 Sawtelle Blvd., Los Angeles 25, Calif.

CIRCLE 58 ON READER-SERVICE CARD

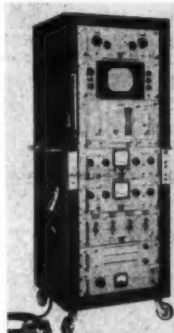
SCIENCE PROJECTOR



New Act-O-Matic Dual-Position Projector operates in horizontal and vertical positions. Vertically, it enables instructor to project actual test tubes, electrolysis cells, electroscopes, etc. live on screen; horizontally, it is standard overhead projector. Unique writing attachment allows projection of class notes, diagrams, etc.—Laboratory Furniture Co., Inc., Box 590, Mineola, L. I., N. Y.

CIRCLE 59 ON READER-SERVICE CARD

CARDIOVASCULAR DIAGNOSIS, SURGICAL MONITORING UNIT

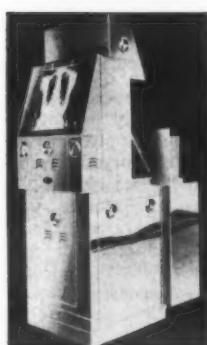


New Dallons-Telco cardiovascular equipment features intracardiac electronic pressure transducers plus intracardiac phonocardiography and blood sampling available in one catheter, no liquid column, no artifacts due to hydraulic problems and catheter whip, no time delay. External manometers

available. Four to eight channel oscilloscopes with high intensity trace, sound amplitude and frequency of murmurs calibrated in mm of Hg, extra channels for ECG, EEG or pneumograph. Four to eight channels photographic recorder with high frequency response employing fluid-damped mirror galvanometers.—Dallons Laboratories, 5066 Santa Monica Blvd., Los Angeles 29, Calif.

CIRCLE 60 ON READER-SERVICE CARD

AUTOMATED X-RAY



New "Fax-Ray, Junior" automatic cut film X-ray processor has capacity of 100 14" x 17" films/hr, smaller films up to 200/hr. Films are delivered dry in 3 minutes. Machine occupies 3 1/2 sq ft, is 25 1/2" x 49 1/2" x 66". Unit has

14" x 17" viewer for immediate reading, uses high-speed standard X-ray chemicals. Double fixing time assures clean, dry, permanent films, triples life of fixer. Double wash-tank permits permanent wash, allows use of wetting agent for clean films under any water conditions; flip feeder prevents misfeeding. Automatic temp control, continuous agitation and filtration, stainless steel construction.—Oscar Fisher Co., Inc., Box 426, Newburgh, N. Y.

CIRCLE 61 ON READER-SERVICE CARD

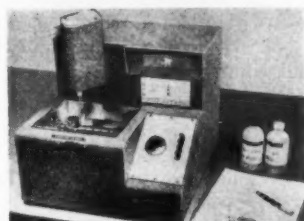
MANOMETRIC GAGE



New laboratory manometer has positive closed-end, uses novel application of "O" rings and precision bore tubing. Permanent ceramic scale with white background for easy accurate reading is constructed as simple well-type "U" tube, is fully compensated to read in cm of Hg at 0°C, range of 0-20 cm.—Roger Gilmont Instruments, Inc., 1 Great Neck Rd., Great Neck, N. Y.

CIRCLE 62 ON READER-SERVICE CARD

OSMOMETER



New Osmometer, "first major improvement in freezing-point osmometry in 8 years," features greater repeatability and accuracy, pre-chill chamber for improved sample repeatability and speed, pushbutton operation, improved refrigeration design, probes tested to 0.0001°C, modular design. Instrument is designed around optimum thermodynamic freezing curve. (Advanced Instruments offers Regional Schools of Osmometry for training and retraining users of equipment in standard methods.)—Advanced Instruments, Inc., 36 Kenneth St., Newton Highlands, Mass.

CIRCLE 63 ON READER-SERVICE CARD

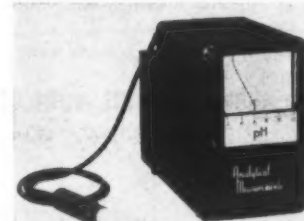
RADIATION MANIKINS



New REMCAL figure (Radiation - Equivalent Manikin-Calibration) constructed of radiolucent shells, vacuum-formed from sheet of Tenite butyrate plastic, has organs filled with radioactive solution for radiological testing. External measurements taken by counters become calibrations for human whole-body counts. New REMAB (Radiation-Equivalent Manikin-Absorption), same figure equipped with human skeleton and system of ports and ducts for insertion of dosimeters, is used to measure radiation absorbed in bones, soft tissues, and organs.—Alderson Research Labs., Inc., 48-14 33rd St., Long Island City 1, N. Y.

CIRCLE 64 ON READER-SERVICE CARD

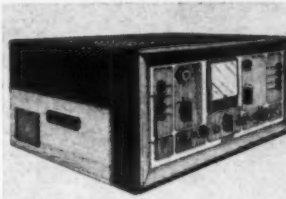
RECORDING pH METER



New combined pH meter and strip chart recorder utilizes electronically modulated amplifier that compensates for line voltage fluctuations and uses standard radio tubes. Strip chart recorder forms front panel of instrument and contains 63' roll of chart paper; chart speeds up to 16"/hr by gear change. Switch disconnects chart drive so that instrument becomes indicating pH meter. Analytical Revolutionary pH Probe Unit provides unitary glass electrode system protected by polyethylene, allows pH monitoring heretofore impractical because of complicated installation or excessive instrument costs. Brochure 3-R.—Analytical Measurements, Inc., 585 Main St., Chatham, N. J.

CIRCLE 65 ON READER-SERVICE CARD

LARYNGEAL DIAGNOSIS

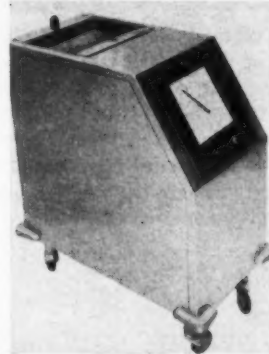


New electronic Laryng-Auto-Vibroscope uses stroboscopic principle to permit analytical examination of vibrating vocal chords, either as objects in apparent motion going through one complete cycle every 4 seconds, or as apparently motionless objects held at some particular phase. Transistorized instrument features pre-set front panel controls, permitting as many as 15 functions to be set up, with pre-set program initiated by foot-operated switch. Vocal sound triggers stroboscopic light, which is directed into mirror extended into throat and reflects behavior of vibrating vocal chords.

Instrument contains audio-frequency generator with built-in speaker and earphone output provisions; frequency meter which indicates generator frequency, then automatically switches to indicate fundamental voice frequency; provision for sufficient power, and triggers to operate 1.8 and 15-watt strobe lamps supplied. Automatic circuitry limits count rate to strobe lamps so that power dissipation is kept within ratings. To eliminate possible erratic triggering, equipment is designed to handle voice frequency amplitude variations of 30 DBV (decibel voltages). Threshold circuitry prevents random noise from triggering lamps.—Espey Mfg. & Electronics Corp., Saratoga Springs, N. Y.

CIRCLE 66 ON READER-SERVICE CARD

BLOOD LOSS MEASUREMENT



New Blood Loss Monitors, Model BLM-1 indicating version and Model BLM-2 with accessory strip-chart recorder, are based on principle of electrical conductivity of blood, totalize blood loss from all sources. Feature large dial from which surgeon can read blood loss in cubic centimeters at considerable distance, meter accurate to 1/2%. Unit is portable, simple to operate, made of stainless steel for easy cleaning and sanitation.—Critical Measurements Div., Industrial Instruments, Inc., 89 Commerce Rd., Cedar Grove, N. J.

CIRCLE 67 ON READER-SERVICE CARD

GLOVE BOXES

New line of double faced Glove Boxes has interior dimensions 36" x 42" x 23". Interchangeable parts allow modification for controlled atmosphere, radiochemistry, and bacteriology or virology applications. Enclosures have removable end panels so that two or more units can be attached together to provide any length desired.—Kewaunee Scientific Equipment, 4017 Logan St., Adrian, Mich.

CIRCLE 68 ON READER-SERVICE CARD

MEDTRONIC medical electronic instruments



CONDUCTION SYSTEM LOCATOR

The chance of surgically induced heart block, long a problem in open heart surgery, is now minimized—if not eliminated—by the proper use of the Medtronic Conduction System Locator. Featuring a specially designed electronic depth probe, this instrument is used to "trace" the cardiac conduction system with an accuracy of one millimeter. As the probe is moved over the ventricular septum, an audible tone changes pitch as the conduction system is passed over. A pronounced rise in pitch indicates the Bundle of His.



CARDIAC SENTINEL

Connected by heart wires or chest electrodes, the Sentinel monitors the ventricular "R" wave. If the heart arrests, or if it blocks below the rate set on the front panel, the Sentinel automatically triggers ventricular systole at a preset rate. Extremely reliable, it does not call "wolf" when no emergency exists, nor does it fail to react when a true crisis is present. Not confused by spurious signals, it cannot mistake its own pulse for an "R" wave. The transistor circuit is operated by its own self-contained power source, completely removing the hazards associated with AC powered equipment.



ELECTRO-COAGULATION GENERATOR

Pick up bleeder—gently squeeze forceps—cauterize only the bleeder. The Medtronic Electro-Coagulation Generator works with the well-known Medtronic Electro-Coagulation Forceps (the insulated forceps with switch in the handle to energize the cautery unit). In addition to working as a standard cautery with forcep control, the unit provides bipolar power for Medtronic's new Bipolar Forceps. In the bipolar mode of operation, the cautery unit automatically stops when the bleeder between the forcep tips is dry. The unit may be switched to unipolar mode of operation at any moment by pressing the foot switch; for example, if one wishes to cauterize a bleeder through a previously clamped hemostat.



ELECTRO-COAGULATION FORCEPS

The Electro-Coagulation Forceps gives the surgeon the absolute and precision control necessary for effective electro-coagulations. Lightly press the forceps handle together... result... a perfect cautery. An automatic switch built right into the handle, eliminates the need to move eyes from operative sight to locate a foot switch. Well insulated to protect the surgeon from accidental burns, its practical design also prevents accidental cautery of edges of incision and adjacent tissues. Available in several sizes, with or without switch, the Forceps will work with your present cautery equipment.

MEDTRONIC INSTRUMENTS

ARE AVAILABLE THROUGHOUT THE WORLD

UNITED STATES
Independent representatives
ALL FOREIGN COUNTRIES
Picker International Corp.
CANADA
Biotronics Laboratories



MEDTRONIC, INC.

3055 HIGHWAY 8 MINNEAPOLIS 18, MINNESOTA
TWX-MP208 Sterling 1-2718

CIRCLE 8 ON READER-SERVICE CARD

For more information on products reported or advertised in this issue, use postage free card bound in this issue -- or write number and date of issue on card and send c/o our Reader Service Department.

Measuring Visual Acuity

Thin, evenly spaced vertical lines moving steadily across the line of vision of the human eye cause an involuntary reaction known as optokinetic nystagmus—a rapid oscillation of the eye-ball resulting from the eye's attempts to follow each line in turn. The range of vision during which the eye continues this motion represents a measure of its ability to adapt, and therefore of its acuity or keenness.



Fig. 1. Patient views horizontally moving parallel lines. Mark II recorder monitors.

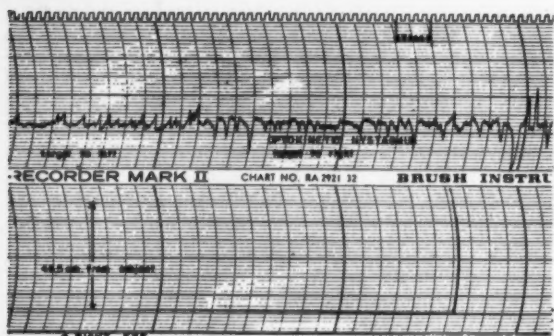


Fig. 2. Chart record shows movement of patient's eye on upper channel. Lower channel indicates distance of scroll from the eye. Upper event channel records time. Bottom event channel indicates right eye is under test.

At the Howe Laboratory of Ophthalmology at Harvard University Medical School, the visual acuity of patients is determined by means of a Brush Recorder Mark II (Brush Instruments, Div. Clevite Corp., 37th & Perkins, Cleveland 14, Ohio), which monitors eye movements.

The test apparatus employs a scroll on which vertical lines, 1/12 centimeter apart, are precisely inscribed. The scroll moves horizontally across a viewing window, causing a to-and-fro movement of the eye. As the scroll is moved away from the patient, the lines appear blurred and also subtend a smaller visual angle. Eye motion is detected by means of bitemporal silver electrodes, which follow the shift in corneo-retinal potential. The output of the electrode is fed first to a blocking capacitor and thence through a low-level preamplifier to one channel of the Mark II recorder. Distance of the moving scroll from the patient is recorded on the adjacent channel through a potentiometer which follows the scroll position.

The recorder's two event-markers are put to use: one notes which eye is under test; the other, connected to a timing signal, records the period during which the optokinetic effect is observed.

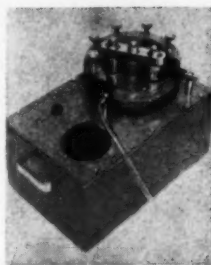
Closed Circuit TV

NEW YORK, N. Y.—A new closed-circuit television system, specially designed to produce high-quality pictures even under difficult lighting conditions, was demonstrated by Fairbanks Morse & Co. (100 Electra Lane, Yonkers, N. Y.) for the first time to leading American and European surgeons and medical specialists attending the Fourth International Conference on Medical Electronics. A large-screen projector enables medical men to see how true-to-life color can be used to screen delicate surgical operations for large audiences. The color camera—less expensive, more compact and simpler to operate than any previously available—utilizes novel optical system several times more efficient than earlier relay lens types. Remote control panel enables it to be operated at distances of 1,000' or more. Any number of monitors or projectors can be used with one camera, and in large installations it is possible to switch from one camera to another.

CIRCLE 69 ON READER-SERVICE CARD

VICTOREEN INSTRUMENT CO. (5806 Hough Ave., Cleveland 3, Ohio) reports \$260,000 in government contracts for three hospital channel analyzers.

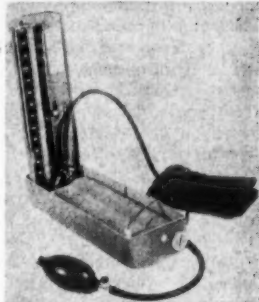
BLOOD PUMP



New Variable Flowrate Blood Pump is compact and self-contained, pumps blood without contamination at controlled, continuously variable flowrates from 0 to 6 liters per minute with negligible hemolysis. Flowrate is shown on a directly-calibrated dial. Pump tubing is replaceable, long-lasting, non-contaminating; is 3/4" ID for 6 liters/min, 1/2" ID for 0 to 3 liters/min. Uses include precision metering at variable flowrates of chemicals, biologicals, food products, etc. which must not be contaminated or contaminate the pump.—Science Sales International, 50 Broad St., New York 4, N. Y.

Circle 70 on Reader-Service Card

ELECTRONIC SPHYGMOMANOMETER



New portable Electronic Sphygmomanometer gives accurate systolic and diastolic readings without a stethoscope, employs ultra-sensitive microphone housed in the compression band. The pulse sounds are amplified by 5-transistor amplifier and are visually reproduced by the lighting of a red lamp adjacent to the mercury column. Powered by four standard flashlight batteries, it is useful for taking blood pressure readings in hospitals, clinics, and dispensaries where background noise level is high, or where repetitive readings must be made, including those taken in the operating or recovery rooms.—Calhear Instruments Co., 412 W. 6 St., Los Angeles 14, Calif.

CIRCLE 71 ON READER-SERVICE CARD

X-RAY PHOTOGRAPHIC PAPER



New Kal-X-Ray photographic paper as used in Kalvaray Film Duplicator reproduces minute details of X-ray negatives in less than 1 minute by completely dry process utilizing ultra-violet and infrared for exposure and development. Kalvaray film duplicating machine and Kal-X-Ray paper can be used by medical teaching institutions, hospitals, X-ray libraries, radiologists, dentists, etc.—Copy Research Corp., 875 W. 15 St., Newport Beach, Calif.

CIRCLE 72 ON READER-SERVICE CARD

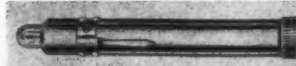
DISPOSABLE RUBBER GLOVES



New disposable vinyl Tru-Touch glove, "more touch-sensitive than any previously developed," is designed for operations where touch sensitivity is important and either product or hand must be protected. New glove is 0.006" thick, has exceptional toughness (tensile strength of 1000 to 1200 psi), costs about 7 cents each, provides close, finger-tight fit without numbing.—Wilson Rubber Co., Industrial Div., 1200 Garfield Ave. S. W., Canton 6, Ohio.

CIRCLE 73 ON READER-SERVICE CARD

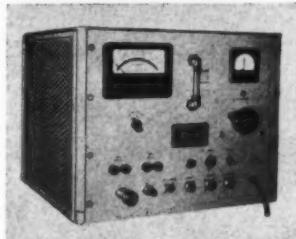
RADIATION MONITOR



New ORNL personal Radiation Monitor gives high-pitched chirps, flashes neon light to warn of exposure to radiation from nuclear reactors, radioisotopes, particle accelerators, fallout, large X-ray machines; clips to wearer's clothing. Miniature mercury cell supplies power for about 30 days uninterrupted operation.—Victoreen Instrument Co., 5806 Hough Ave., Cleveland 3, Ohio.

CIRCLE 74 ON READER-SERVICE CARD

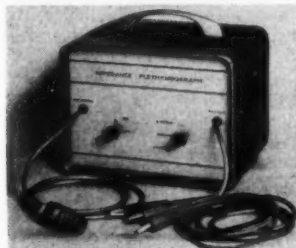
CALORIMETER



New Calorimeter, capable of measuring any power that can be transferred to a circulating fluid, consists of constant-flow circulating system, cooling system, thermopile and microammeter. Direct reading, it can be calibrated in watts, BTU/min, hp or ft-lb/min. Ranges from 0.1 to 3000 BTU/min.—Electro Impulse Laboratory, Inc., 208 River St., Red Bank, N. J.

CIRCLE 75 ON READER-SERVICE CARD

IMPEDANCE PLETHYSMOGRAPH



Model 3-H Plethysmograph is used to display pulse-volume waveforms on an ECG machine or scope. Uses surface or hypodermic electrodes. Shows effects of nerve block, drugs and grafts. When used with infant cuff, permits accurate determination of systolic pressure on infants, monkeys and dogs. Transistor operated on two flashlight cells.—Parks Electronics Lab., Rt. 2, Beaverton, Ore.

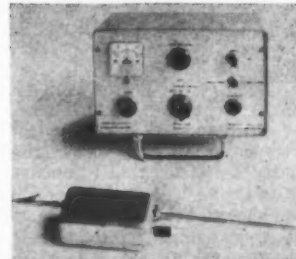
CIRCLE 76 ON READER-SERVICE CARD

VIDICON TV CAMERA

New Model V-945 Vicon vidicon TV camera has picture resolution of 650 lines vertically and 650 lines horizontally, "double the picture resolution of conventional TV camera systems." It allows installation of low-cost systems for document transmission by television in hospitals and medical clinics. Camera transmits clear, easily-read image of documents with typewriter, or even smaller, size print, utilizes cable or microwave. Any number of originating units and viewing units can be hooked into a single system.—Vicon Div., American Microwave & Television Corp., 1369 Industrial Rd., San Carlos, Calif.

CIRCLE 77 ON READER-SERVICE CARD

AMPLIFIERS/POWER SOURCE



New Models AT-10 and AT-11 transistorized Preamplifiers can be used to convert d-c oscilloscopes or pen recorders into recording instruments for ECG, EEG, and EMG. New Model C-1 a-c, d-c low level source checks gain, linearity, rise time and distortion in low-level amplifiers, has 1.0-v output in 56 fixed steps. Accuracy, 1% + 1 μv absolute, 1/2% linearity.—Medistor Instrument Co., 1443 Northlake Way, Seattle 3, Wash.

CIRCLE 78 ON READER-SERVICE CARD

ENVIRONMENTAL INCUBATOR-SHAKER



New Psycrotherm, Model G26, controlled-environment incubator-shaker incubates static and microbial shake cultures simultaneously or separately, permits selection and control of agitation and atmosphere for growth of aerobic and anaerobic organisms, can be used as BOD incubator. Lighting manifold available for photosynthesis studies, temp range from 0° to 60°C. Control tolerance and temp gradient within ±0.05°C. Rotary agitation adjusts between 50 and 400 rpm; reciprocating agitation, between 40 and 285 oscillations per minute; stroke between 0 and 3 1/2". Unit has interchangeable platforms, 10 1/2 cu-ft chamber, internal electrical outlet, gassing facilities for circulation of gas mixtures and humidified atmospheres into tightly sealed working chamber. Catalog.—New Brunswick Scientific Co., Box 606, New Brunswick, N. J.

CIRCLE 79 ON READER-SERVICE CARD

ELECTRONIC TEACHING AIDS



New clear plastic, color-coded circuitry blocks for teaching medical electronic technology interlock to form complete system, enable students to see and understand actions of circuitry. In conjunction with laboratory manuals, units provide quick and simplified instruction in electronic and scientific fundamentals.—Electronic Aids, Inc., 857 N. Eutaw St., Baltimore 1, Md.

CIRCLE 80 ON READER-SERVICE CARD

BIOTELEMETRY VEST



New Model 99 Biotel Biotelemetry System includes sensors, transmitter and power supply in vest unit, weighs less than 3 lb, telemeters 6 channels (ECG, EEG, respiration, temperature, galvanic skin response, voice). Standard range is 200 yards with 10 hr continuous transmission, is adaptable for long range and airborne requirements, operates on IRIG standard frequencies.—Spacelabs, Inc., 15521 Lanark St., Van Nuys, Calif.

CIRCLE 81 ON READER-SERVICE CARD

ECG TELEMETRY

New Metretek 1000 Biomedical Telemetry System remotely monitors ECG signals of cardiology patients at exercise or rest. System includes 5-oz, pocket-size transmitter which transmits without wires or external antenna; detachable rechargeable battery (plus alternate battery); receiver with built-in automatic battery charger and tester; special permanently sealed silver-disc electrode leads in two convenient lengths; and chart showing electrode locations most satisfactory for least muscular interference. Encapsulated, solid-state transmitter complies with FCC regulations and can be tuned to any frequency in FM broadcast band; low voltage requirement eliminates explosion hazard. One Metretek receiver can be tuned to monitor ECG signals sequentially from several transmitters.—Avionics Research Products Corp., 4254 Glencoe Ave., Venice, Calif.

CIRCLE 82 ON READER-SERVICE CARD

Oxygen Therapy for Infants

Los Angeles County General Hospital uses four Beckman D-2 Oxygen Analyzers in the premature nursery. Analyzer operation is based on the fact that oxygen is attracted into a magnetic field. The gas sample is drawn into the analyzer by squeezing the aspirator hand bulb, and is measured for magnetic susceptibility. A small glass



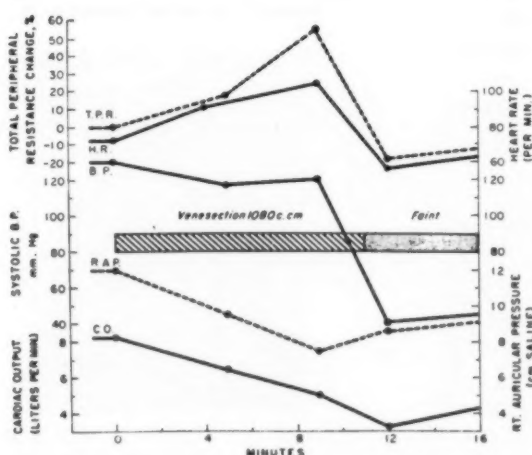
dumbbell which is suspended on a taut quartz fiber in a non-uniform magnetic field is the core of the oxygen measuring system. When the sample is drawn into the test chamber surrounding the dumbbell, the magnetic force is altered and the dumbbell rotates until the magnetic force on the test body is balanced by the torsional restoring force of the quartz fiber. A small mirror attached to, and rotating with, the dumbbell throws a beam of light on the D-2 analyzer scale. The position of the beam of light indicates an exact measurement of the oxygen concentration inside the incubator . . .

Since the sight of the incubated premature infant can depend on the medical care received while undergoing oxygen therapy, the need for standard procedures for oxygen administration cannot be overstressed. . . . Oxygen analyzers guard against development of retrolental fibroplasia in newborn premature infants. . . . (From 12-page "The Analyzer," Vol. 1, No. 1, Scientific and Process Instruments Div., Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.)

FOR THIS LITERATURE CIRCLE 83 ON READER-SERVICE CARD

Instantaneous, Continuous Operative Blood Loss Measurement

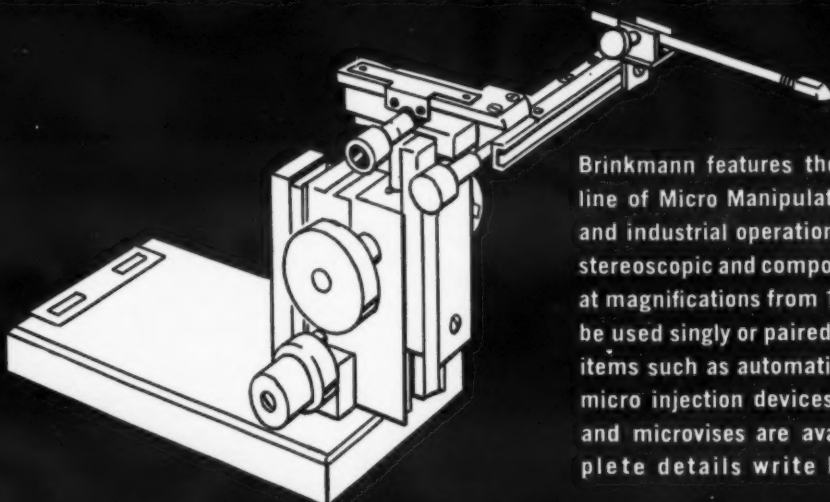
In surgery entailing blood loss, the need for replacement is self-evident. . . . Vital signs cannot be relied upon to indicate the extent of blood loss. The changes in blood pressure, cardiac output, heart rate and total peripheral resistance during experimental hemorrhage are illustrated. . . . Not only are the changes in vital signs late



indications of decompensation in hemorrhage, but the return of vital signs cannot be relied upon as an index of the adequacy of blood replacement. . . . Hazards are also encountered when blood is replaced too rapidly since the high concentration of citrate in bank blood reduces the amount of ionizable calcium in the blood. The effect of low calcium is augmented by high concentration of potassium present in the plasma of bank blood. These factors may be responsible for some failures of transfusion to alleviate the changes in hemorrhage. . . . In the past, a number of systems have been devised to measure blood loss. . . . The most precise method thus far devised . . . is the conductivity method, which gives instantaneous and continuous indication. . . . (From 8-page Form 19041D, "The Blood Loss Monitor," Critical Measurements Div., Industrial Instruments, Inc., 89 Commerce Rd., Cedar Grove, Essex Co., N. J.)

FOR THIS LITERATURE CIRCLE 84 ON READER-SERVICE CARD

MICRO MANIPULATORS



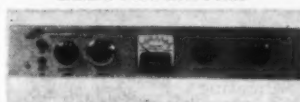
Brinkmann features the most complete line of Micro Manipulators for scientific and industrial operations. Available with stereoscopic and compound microscopes at magnifications from 10 to 1000 x. Can be used singly or paired. Many accessory items such as automatic pipette pullers, micro injection devices, pipette holders and microvises are available. For complete details write Department M.

BRINKMANN

INSTRUMENTS INC., 115 CUTTER MILL ROAD, GREAT NECK, NEW YORK

CIRCLE 9 ON READER-SERVICE CARD

ELECTROMETER



New E-302 Electrometer, a completely new extended-range unit, incorporates circuitry improvements which allow the technician or scientist to switch from event to event without affecting the input function. It has been designed specifically to perform under the exacting requirements demanded by research in gas chromatography, spectrometry, air pollution detection, gamma monitoring, etc. Features: coarse and fine zero adjustment, positive/negative multiplier switch which operates independently of the range switch, improved stability through an electronically regulated power supply of 0.01%, added ranges covering 10⁻¹² to 10⁻³ amp F.S., improved response time—ten times faster than previous models, 2% accuracy.—Gyra Electronics Corp., Washington & Elm Sts., Box 184, La Grange, Ill.

CIRCLE 85 ON READER-SERVICE CARD

SPECTACLE-TYPE LOUPE



New spectacle-type Allscope Loupe 3-power glass functions like single-eye magnifier but focuses both eyes on work (normal working distance 12"). Eliminates high ocular adjustment caused by only one eye covering field under magnification. Easily adjusted nosepiece and pupillary distance, anti-reflection hard-coated optics.—Wollensak Optical Co., 850 Hudson Ave., Rochester 4, N. Y.

CIRCLE 86 ON READER-SERVICE CARD

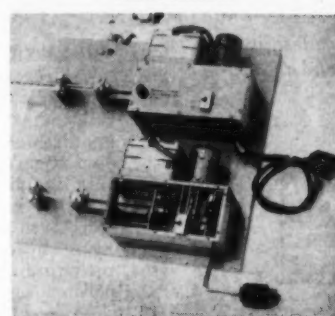
AIR ABRASIVE TOOL



New Airbrasive tool deburrs with abrasive particles propelled by gas at 1100 ft/sec, achieves "superior quality" hypodermic needles, increases unit production efficiency 10 or 12 times. Airbrasive removes all traces of burrs within lumen of bevel, and at bevel heel where burrs are most difficult to remove.—Airbrasive Dept. CI, S. S. White Industrial Div., 10 E. 40 St., New York 16, N. Y.

CIRCLE 87 ON READER-SERVICE CARD

SYRINGE FOR GLAUCOMA RESEARCH



New automatic Syringe for use in glaucoma research, developed for University of Minnesota's School of Medicine, increases or decreases fluid pressure within the eyeball in minute measurements. Unit consists of two highly accurate units; each may work independently at same time, or one can be used as standby. Syringes, automatically actuated by extremely small changes in eyeball pressure, not only raise or lower pressure in small increments but maintain it at desired level with accuracy.—Dynaeco Mechanisms, Inc., Subs. Dynamic Gear Co., Inc., Amityville, N. Y.

CIRCLE 88 ON READER-SERVICE CARD

REFRIGERATED CENTRIFUGE

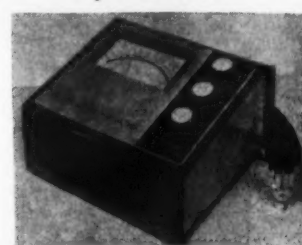


New Model PR-2 Refrigerated Centrifuge provides speeds and volumes for practically every laboratory requirement, can swing over 70 different accessory combinations, volumes up to 4 x 1000 ml. Maximum speed of 5100 rpm gives corresponding forces of 4240 x G (6 x 100 ml). A multi-speed attachment allows speeds up to 19,000 rpm and corresponding forces of 25,000 x G (6 x 7 ml). A variety of basket heads for use in continuous flow batch separations and a shaker head for shaking under controlled temperature are available.

Temperature in the guard bowl is held to ±1°C. When an angle head operates at maximum speeds, temperature is maintained to -15°C or below.—International Equipment Co., 1284 Soldiers Field Rd., Boston 35, Mass.

CIRCLE 89 ON READER-SERVICE CARD

pH METER



New Model 31 Companion pH Meter provides maximum simplicity of operation with routine precision within 0.05 pH. Wide (6 1/4") mirror-backed scale covers full 0-14 pH range, permits easy, direct reading to 0.02 pH. Zero-restoring circuit makes operations completely drift-free; potentiometer or current-type recorders plug into back panel without circuit modifications; accessories adapt unit to Karl Fischer titrations and provide automatic temperature compensation. Screw base glass and reference electrodes require only 3.5-ml sample and can be used in containers as small as 10-ml beaker, eliminating necessity of buying "small sample assemblies." Accessory permits using electrodes of other manufacture. Bulletin B-267A.—Coleman Instruments, Inc., 42 Madison St., Maywood, Ill.

CIRCLE 90 ON READER-SERVICE CARD

TIME LAPSE CINEPHOTOMICROGRAPHY



New advanced instrument for time lapse cinephotomicrography is completely integrated unit for use with living materials, especially in tissue culture studies. Includes incubator, microscope, camera, high voltage power supply, xenon flash unit, and other special equipment. Incubator allows setting and maintaining temp to accuracy of ±0.2°C in range of 30° to 40°C, and is large enough (24" x 20" x 19") for microscope, flash housing, ancillary equipment, and storage. Observation eyepiece permits continuous viewing. 16-mm movie camera with special 400' magazine takes pictures at frame rates of 1 to 128/min.—Sage Instruments, Inc., 9 Bank St., White Plains, N. Y.

CIRCLE 91 ON READER-SERVICE CARD

Responses of the Human Ear to Sound

Hearing, like so many of the other functions of the body depending upon reactions of the nervous system to external stimuli, involves the creation of a minute electrical potential or voltage. In the case of hearing, this potential is generated in the cochlea (the spiral tube which forms part of the inner ear) . . . Recording the potential induced in the cochlea required placing an electrode against the ear's round-window membrane. Doing this necessitated the construction of a stable electrode holder consisting of an upright attached to the operating table's head holder, and a side arm extending over the patient's head. This arm allowed mounting of three micromanipulators to enable the surgeon to place the electrode accurately against the membrane with the aid of an operating microscope.

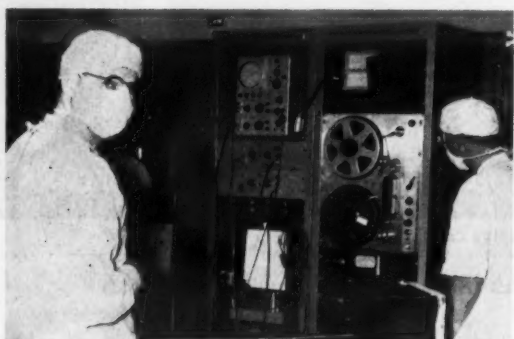


FIG. 1. The operating room during the described procedure. Note the portable stimulating and recording console.

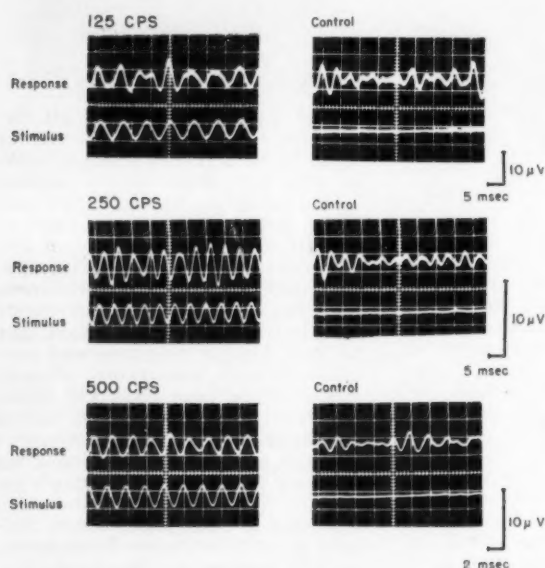


FIG. 2. Case 5 (otosclerosis). Cochlear potentials obtained for 125, 250 and 500 cycles per second. (Courtesy "Annals of Otology, Rhinology and Laryngology," Vol. 69, No. 2, June, 1960, p. 459)

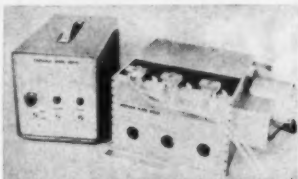
The stimulating and recording equipment, built into a portable console, consisted of a four-channel Ampex Model 300 tape recorder with a series of preamplifiers (Fig. 1). Using the Ampex, a number of pure tones of different intensities and a series of clicks were recorded on a master tape. From it, a second or matrix tape was made with constant settings, and it, in turn, was used to make numerous patient tapes so that all patients could be given the same stimuli.

During actual tests, a patient tape was played through an audio-amplifier which activated a speaker, the output of which was delivered to the patient's external ear canal through a four-foot tube. Tape output, as played through the tube, was calibrated at 2½ cm from the outer end of the ear speculum (an instrument for viewing a body passage or cavity) used to expose the round window. At 1 cm from the speculum's inner end, a condenser microphone was mounted so that the corrected microphone reading could be converted to sound pressure measured in dynes/cm².

A foot switch at the surgeon's chair activated the console so that simultaneously the ear was stimulated, the potential response was recorded, and the surgeon's verbal comments were captured on the tape's third track. Amplifier output and the response were also viewed on an oscilloscope in addition to being tape-recorded.

Fig. 2 illustrates the cochlear potentials elicited with sound stimuli of varying frequencies. Note the close correlation of cochlear response with stimulus frequency.

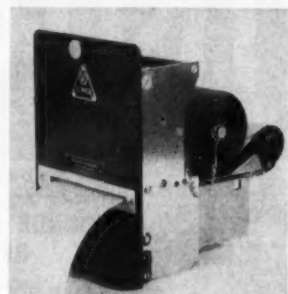
UNIFORM FLOW PUMP



New Uniform Flow Pump has range of 30 to 500 cc/min, is continuously adjustable over entire range, can be set precisely, and is pre-calibrated. System is compatible with blood, plasma, and fluids likely to be found in laboratory. Output flow is independent of back pressure, is uniform in time, and does not depart from the average at any setting by more than 0.3 cc. Apparatus pumps against back pressure of 300-mm of Hg. As difference between output and input pressure varies from 0 to 180-mm Hg, flow rate changes by less than 2%.—Sage Instruments, Inc., 9 Bank St., White Plains, N. Y.

CIRCLE 92 ON READER-SERVICE CARD

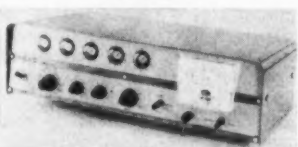
PRINTING COUNT RECORDER



New Model ZDG III 2/19 Printing Count Recorder has four 5-digit counting heads, with common electrical reset. Maximum counting rate is 25 impulses/sec, printing time 50 msec, reset time 700 msec. Each channel counts individually and may be made to print individually. Printing is by interleaved carbon on tape. Other counting heads may be incorporated, including time and data printers. Operates on 24-v dc. Panel is 8½" x 5½".—Presin Co., Inc., 2014 Broadway, Santa Monica, Calif.

CIRCLE 93 ON READER-SERVICE CARD

SCALER



New Model E-130 transistorized "analytical" Scaler is compatible with all types of counting systems from basic GM counting to complex automatic sampling systems. High-voltage supply adjusts from 300-2500 v, allows wide range, provides fixed reference source voltage (approx 1000 v) for accurate reproducibility. Separate gain discriminator controls facilitate precise integral spectrometry. When coupled with REAC transistorized preamplifier, millivolt sensitivity is obtained for proportional gas flow counting. Spec Sheet.—Radiation Equipment & Accessories Corp. (REAC), 665 Merrick Rd., Lynbrook, N. Y.

CIRCLE 94 ON READER-SERVICE CARD

GAS TESTER



New LKB 3326-A Gas Tester is mobile, simple and inexpensive. It determines the degree of air contamination caused by trichloroethylene, perchloroethylene and gasoline (which cause headache, dizziness and a general feeling of unfitness). Squeezing the rubber aspirator bulb pulls air into the indicator tube. Fumes change the color of the white powder contents of the tube, thereby indicating the concentration of poisonous vapors. Bulletin 3326-03.—LKB Instruments, Inc., 4840 Rugby Ave., Washington 14, D. C.

CIRCLE 95 ON READER-SERVICE CARD

Order Your Personal Copy-NOW

Process Control \$2.00

by A. J. Young. A "must" for all who have to do with the automatic control of industrial processes, this book combines for the first time the practical "how" and the theoretical "why". Paperbound, 134 pages, 1957 (second printing).

Process Control Analysis \$2.00

by M. H. LaJoy and E. A. Baillif. An essential first step in analysis of closed-loop controlled processes via frequency response of the system. Clothbound, 72 pages, 1956.

100 Electronic Circuits—Vol. 1 \$2.00

by M. H. Aronson and C. F. Keizer . . . covers amplifiers, oscillators, pulse circuits, phase shifters, etc. Complete with all circuit component values and response specifications. Paper, 180 pages, 1957.

100 Electronic Circuits—Vol. 2 \$2.00

Second in the series by Aronson and Keizer. Vol. 2 also gives complete values and specifications for 100 "new" circuits not covered in Vol. 1. Complementing each other perfectly, the two volumes become a powerful circuitry design tool. Vol. 2, Paperbound, 1960.

The Automatic Factory \$1.50

by June, et al . . . a fresh viewpoint on what "manless factories" can be . . . free from the generalities, and misconceptions so prevalent on this subject. Cloth, 88 pages, 1955.

Nuclear Reactors for Industry and Universities \$2.00

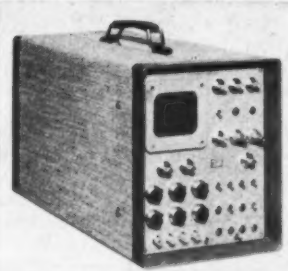
edited by E. H. Wakefield. The several distinguished authors and editor Wakefield cover types, availability (1954), operation, protection, control, experiments, legal aspects, and present a detailed cost study. Cloth, 92 pages, illustrated, 1954.

Scientific and Industrial Glass Blowing \$5.00

. . . and Laboratory Techniques by W. E. Barr and Victor J. Anhorn. New revised edition covers construction in detail. Explains operating principles of all pieces. Includes review of history, and most recent developments. Original edition acclaimed "best of its kind—not only on glass blowing but hundreds of techniques." Paper, 408 pages, 300 illustrations . . . new edition 1959.

Instruments Publishing Co., Inc.
845 Ridge Ave.
Pittsburgh 12, Penna.

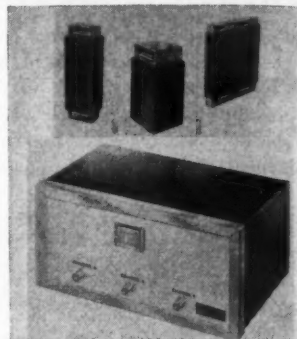
PORTABLE 400-CHANNEL PULSE HEIGHT ANALYZER



New Model 404 portable 400-channel pulse height analyzer uses a magnetic core memory system with data being stored in parallel binary-coded-decimal form. Data can be read out directly from the memory into a printed device without auxiliary equipment. The unit accommodates four detectors at the same time and stores four separate spectra. Each input has its own amplifier and associated gain control. Pulse amplitude spectrum is displayed on a built-in cathode-ray oscilloscope. Companion readout unit Model 500 is recommended for laboratories requiring a high-speed paper tape printer. Data may also be read out through a high-speed paper tape punch, IBM computer typewriter, XY recorder, or a strip-chart recorder.—Technical Measurement Corp., 441 Washington Ave., North Haven, Conn.

CIRCLE 96 ON READER-SERVICE CARD

BIOMEDICAL TELEMETERING



New three-channel Multi-pack allows simultaneous remote monitoring of three bioelectrical signals by telemetry. One channel has operating characteristics suitable for ECG, EMG, EEG, or galvanic skin response signals; two are for slower-varying signals such as temperatures, respiration or blood pressure. Self-contained unit amplifies, multiplexes, and transmits signals over standard FM frequency band to FM tuner-receiver up to 100 yards. B-30D Discriminator then restores signals to proper form for recording and/or display. Two units per person suffice for observing or recording at central nursing station all critical signals from patients in intensive care wards or recovery rooms.—Medical Electronics and Bionics Dept., Litton Systems, Inc., Woodland Hills, Calif.

CIRCLE 97 ON READER-SERVICE CARD

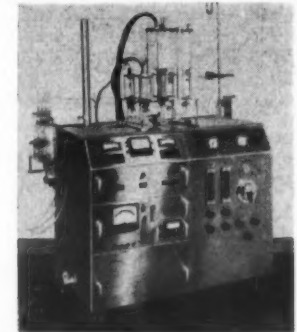
PORTABLE AUDIOMETER



New 19-lb Model 1100, "first fully transistorized instrument capable of testing both tone and speech," meets all ASA Specifications, tests by air conduction, bone conduction and free field. Unit provides tone tests in 9 steps from 250 to 8000 cycles, speech tests through a recording or "live" by means of its own microphone. Signals can be presented by earphones to either or both ears; phone balance control regulates relative intensities; monitor earphone with volume control is also provided. Threshold-level dial ranges from 10 to 100 db in 1-db steps. Test tone can be interrupted manually or by automatic pulses, and masking signal of adjustable intensity is provided. Speech test record contains two spondaic word lists and two phonetically balanced word lists.—Otarion Listener Corp., Ossining, N. Y.

CIRCLE 98 ON READER-SERVICE CARD

PERFUSION APPARATUS



New Clark-Selas Perfusion Apparatus for oxygenation and pumping of blood under ideal physiological and clinical conditions for extra corporeal flows during open-heart surgery features new, unique method of oxygenation by bringing oxygen bubbles having variable surface area into contact with the blood. Safe defoaming is accomplished under vacuum conditions. Positive, safe method for pumping blood under pressure and vacuum in a closed system simulates pumping action of human heart. Three separate coronary blood recovery pumps are available. Heat exchanger system permits operation not only in normal blood temperature range, but also under moderate and profound hypothermia conditions. Safety devices permit operation in hazardous areas.—Selas Flotronics, Div. Selas Corp. of America, Spring House, Pa.

CIRCLE 99 ON READER-SERVICE CARD

CIRCLE 230 ON READER-SERVICE CARD

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HONEYWELL BODY FUNCTION RECORDER

Monitor patient condition
constantly and reliably

Safe, accurate measurement of

- TEMPERATURE
- RESPIRATION RATE
- PULSE RATE
- SYSTOLIC BLOOD PRESSURE
- DIASTOLIC BLOOD PRESSURE

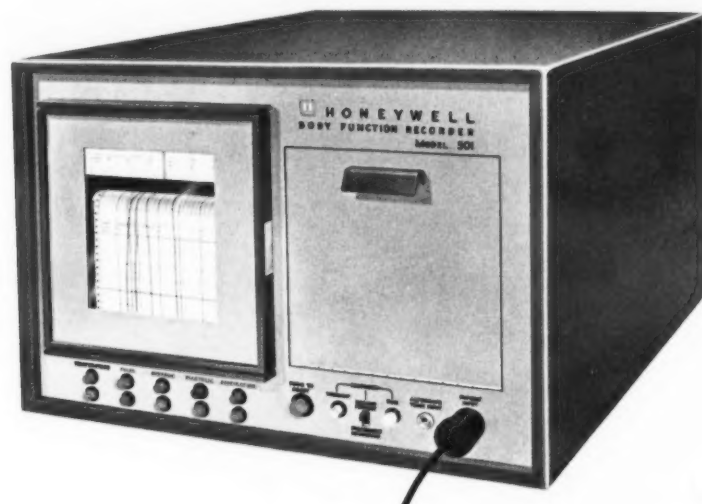
A COMPLETE SURVEILLANCE

The Honeywell Body Function Recorder is a precision electronic instrument specifically designed to monitor the condition of critically-ill and post-operative patients. It measures oral or rectal temperature, pulse rate, respiration rate, systolic and diastolic blood pressure.

Medical authorities familiar with the special requirements for the intensive care of post-operative or critically-ill patients agree that the relative behavior of these physiological functions provides an accurate picture of the overall condition of such patients, indicating not only imminent or sudden crises, but long-term trends as well.

The functions are recorded in five colors on a single record and on expanded scales for maximum readability. Function values are automatically compared with selectable, pre-set upper and lower limits, departure from which actuates appropriate alarms. The Body Function Recorder thus frees highly-trained nursing personnel to perform uniquely human tasks, and provides a tireless continuity of accurate surveillance that is beyond human capabilities. The BFR record can be conveniently removed from the machine and placed in the patient's chart, providing the doctor with a complete history of his patient's condition.

HONEYWELL BODY FUNCTION RECORDER MODEL 501



Simplicity of Operation

The few necessary controls of the BFR are located on the front of the instrument, plainly labeled for foolproof operation by non-technical personnel following minimal instruction. In accordance with the doctor's orders, upper and lower limits are set on concentric dials, one for each function.

Each function to be measured is controlled by

an OFF-ON switch and is monitored by indicator lamps, green for satisfactory condition, red to indicate that the function has passed the pre-set limits. Alarm circuits are self-checking, and discriminate between artifacts and genuine trends. The alarm circuit for each function *must* receive the proper signal, within the pre-set limits, or an alarm is given.

INSTRUMENT for intensive care

Patient Comfort and Safety

The design of the BFR assures patient comfort and safety. The headpiece allows complete freedom of motion and does not interfere with other equipment necessary for patient care. It is important to note that the headpiece design eliminates the need for electrodes held in place by tight bands about the extremities, occluding pressure cuffs, and arterial punctures, all with their attendant hazards during long-term use or on unconscious patients. The headpiece design prevents pressure points, and the non-traumatizing transducers (information pickups) are comfortable.

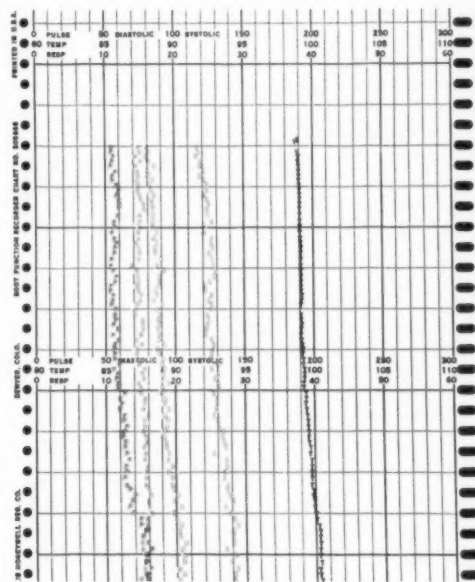
The single cable from the headpiece provides the following important safety and comfort features:

Prevents hook-up errors—When the single-connector cable is "plugged in" all necessary connections are correctly made at once.

Provides mobility—The patient may move about freely with no danger of becoming enmeshed in a tangle of wires.

Saves time—The cable connector is merely pushed into its keyed socket. The transducers and headpiece take less than a minute to put on.

Emergency disconnect—When the patient must be moved in a hurry, he is completely disconnected from the measuring unit in the split second required to un-plug the cable connector.



Record shown 1/2 actual size

Unitized Headpiece

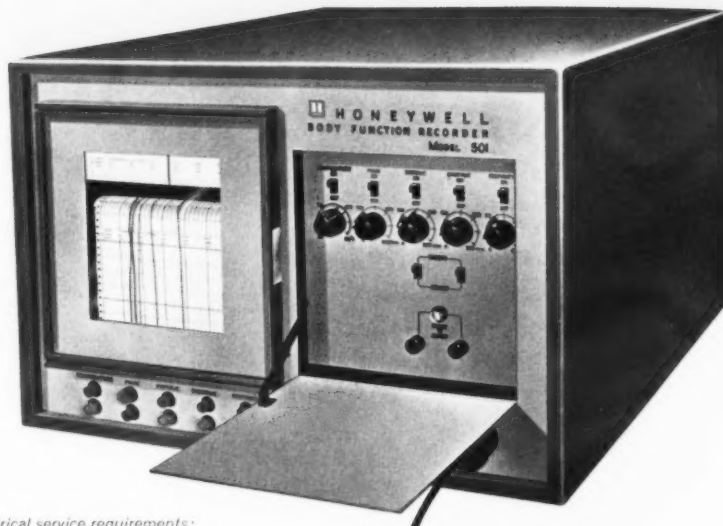
All transducers are located within or are a part of the cushioned headpiece. The complete assembly is light but rugged, easily disinfected, and simple to put on. Transducers are easily positioned. Reliability is assured since there are no electrode pastes to dry out, needles to clog, etc. The possibility of "false alarms" due to transducer failure is therefore minimal and, of paramount importance, *actual* alarm conditions will always be promptly detected.

Single, Continuous Record

A complete measurement cycle is accomplished every two minutes. All measurements are printed out on a record 5 inches wide moving at two inches per hour. Each function is recorded in a different color using descriptive characters—for instance, "P" for Pulse. The record has scale information every four inches and provides space for patient identification.

RANGE OF MEASUREMENTS

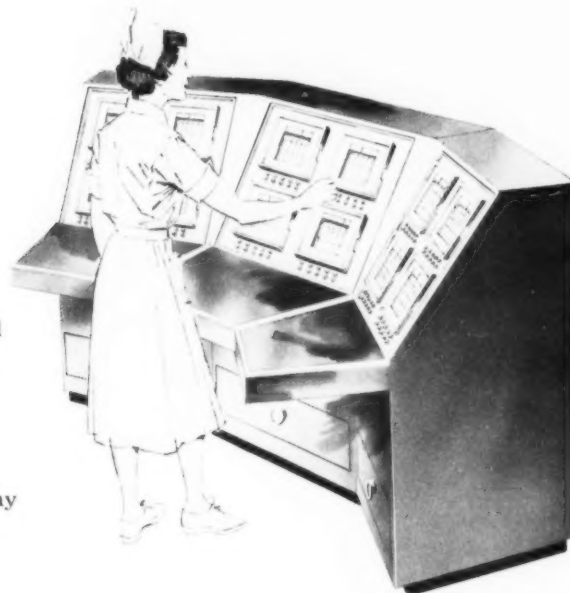
FUNCTION	RANGE
Temperature	80° to 110°F
Pulse Rate (30 sec. avg.)	30 to 240 per min.
Respiration Rate (60 sec. avg.)	4 to 60 per min.
Blood Pressure— Systolic	60mm to 240mm Hg.
Blood Pressure— Diastolic	30mm to 240mm Hg.



Normal electrical service requirements:
117V A.C., 60 cycle, 200 watts
All specifications subject to change without notice

CENTRAL STATION APPLICATION

The components of the Body Function Recorder are designed for central station installation as well as bedside monitoring of individual patients. The Measuring Unit, to which the headpiece cable is connected, remains near the patient. It is connected by inexpensive cable to the Recorder Alarm Unit, located in the Central Station Console with the other Recorder Alarm Units that make up the system. Patients may be as far as 500' from the Central Station, and there is no limit to the number which can be monitored by such an installation.



For complete information contact Minneapolis-Honeywell, Electronic Medical Systems, 5200 East Evans Avenue, Denver 22, Colorado

Honeywell



Electronic Medical Systems

EMS:7

An Air Damped Artificial Mastoid

Those skilled in the hearing aid arts are familiar with a long-existing need for a reproducible standard capable of measuring the response of bone conduction receivers. Stable acoustic devices in the form of 2-cc and 6-cc couplers have been developed for the measurement of the insert type and cushion earphone, but to date no comparable standard has been known for bone conduction devices. Previous investigations presented the average mastoid and forehead parameters obtained under various conditions of driver size and coupling force.

An Artificial Mastoid which "integrated" the force imparted to a pad of visco-elastic substance was

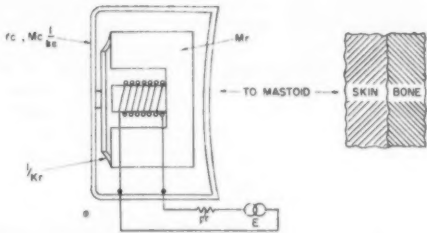


FIG. 1. CROSS SECTION, bone receiver and mastoid.

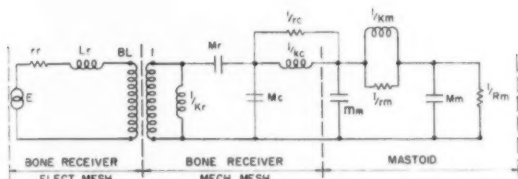


FIG. 2. ELECTRO-MECHANICAL circuit

a departure from previously described mastoids in that the flesh simulating pad was backed up by a beam of high stiffness. A strain gage attached to the beam measured deflection. In addition to a beam, the strain-gage mastoid measured the integrated vibro-motive force over the entire face of the bone conductor rather than at a single point. No attempt was made to determine quantitatively the nature of the differences in response one would expect between the point and uniform contact method.

In all these devices the basic impedance matching member was a piece of visco-elastic substance. Such materials vary from batch to batch, and also are variable with temperature and humidity conditions. Furthermore, these materials are very susceptible to aging, being modified in time as a result of the action of ozone and light.

At the 1958 November meeting of the Acoustical Society the details of a mastoid that is reproducible and virtually immune to any aging effect were presented. The parameters used were those determined by the Bureau of Standards for human mastoids for a driving tip diameter of 2 cm.

Fig. 1 shows an approximate cross-sectional view of a typical small bone receiver widely used in audiometers and hearing aids. The plastic outer housing makes contact with the head and acts as a complaint drive rod. Fig. 2 is the equivalent circuit of the entire bone receiver and mastoid system . . . (Abstracted from paper given at ISA-Montreal Bio-Medical Electronics Sessions, June 1960; Erwin Weiss, Director of Physical Research, Beltone Research Labs., 4850 W. Belmont Ave., Chicago 41, Ill.)

FOR THIS LITERATURE CIRCLE 100 ON READER-SERVICE CARD

Thermoplastic

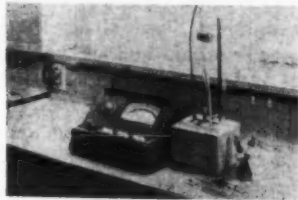
Bavick-11 thermoplastic chemical and solvent resistance other water-white transparent plastics. It is especially resistant to alcohols, mineral acids, strong alkalis, aliphatic hydrocarbons, fatty acids, organic acids, essential oils and detergents . . . Dimensionally stable and retains crystal appearance despite repeated sterilization in boiling water and low pressure steam. Not affected by alcohol and other commonly used medical solvents . . . (From new 4-page bulletin, Plastic Div., J. T. Baker Chemical Co., Phillipsburg, N. J.)

FOR THIS LITERATURE CIRCLE 101 ON READER-SERVICE CARD

For More Information on the Products Listed Circle the Corresponding Number on the Reader-Service Card

CIRCLE 230 ON READER-SERVICE CARD

BLOOD pH ASSEMBLY



New Model 76 Expanded Scale pH meter is especially suitable for use with Beckman Thermostatic Constant Temperature Block and Micro Blood pH Assembly. These three units can be combined to form efficient, accurate assembly for measuring blood pH. By setting expanded scale on Model 76 for full scale range of from 6 to 8 pH, operator can bracket normal blood pH region of 7.3 to 7.4 pH to obtain accurate readings. Thermostatic Constant Temperature Block maintains blood at body temp to avoid pH variations caused by temperature fluctuations. Micro Blood pH Assembly is complete electrode and sample chamber for pH measurement of extremely small blood samples. Complete Blood pH Meter Assembly assures greater precision in pH measurements of blood and other body fluids. Bulletins 777-A, 778, 780.—Scientific and Process Instruments Div., Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Calif.

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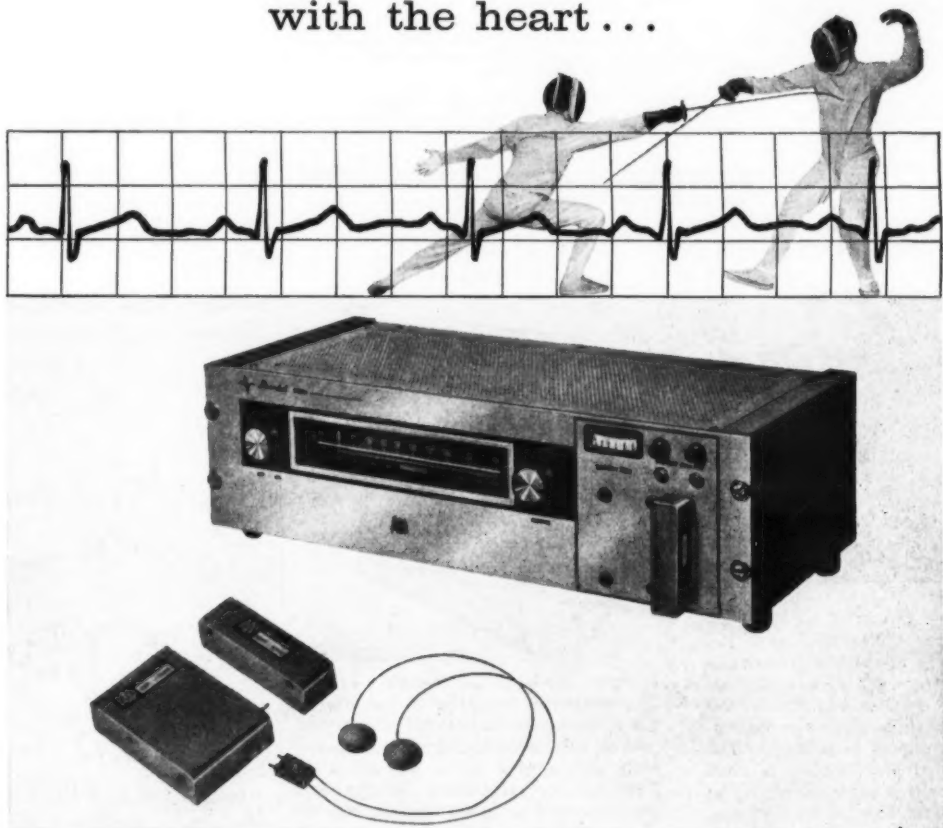


CANAL INDUSTRIAL CORP.
Dept. D10 4935 Cordell Avenue
Bethesda 14, Maryland

CIRCLE 122 ON READER-SERVICE CARD

In touch

with the heart . . .



with the low-cost METRETEL 1000

The Ideal System for Remote ECG Signal Monitoring

The versatility of the Metretel 1000 System allows even the hearts of athletes in action to be monitored accurately. This low-cost biomedical telemetry instrumentation provides the cardiologist, the physiologist, the anesthesiologist and the psychiatrist with the latest scientific method for remote monitoring of ECG signals.

The pocket-size, battery-powered transmitter weighs only five ounces and transmits up to 100 feet without external wires or antenna. The FM receiver has outputs for standard recorder or oscilloscope attachments, and includes a battery charger and tester.

The Metretel 1000 System complies with FCC rules and regulations and is guaranteed against defects in workmanship and materials for one year of satisfactory operation.

Complete price of system: \$895.00 f.o.b. Venice, California.

Write to Dept. MEN 9-1 for complete data.



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4254 Glencoe Avenue, Venice, California

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C-225 CARDIO- TACHOMETER

An advanced, flexible instrument for instantaneous heart rate measurement.

- Linear direct reading scale
- Extra wide range
- Adapts to most recorders
- Simultaneous heart rate & ECG
- Choice of ECG electrodes or pressure pulse pickup
- Low cost
- Compact, portable, reliable



Waters electro-medical instruments
THE WATERS CORPORATION
ROCHESTER, MINNESOTA

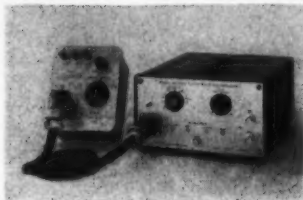
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LRA 043 Negative Capacity Electrometer. DC coupled for intracellular microelectrode recording. 10 billion ohms input impedance. Internal calibrator and differential noise amplifier.

LPS 040 and LPS 041 Regulated Power Supplies for these and other members of the Argonaut line of modular biomedical instrumentation; custom quality at modest cost.

CIRCLE 13 ON READER-SERVICE CARD

BIOPHYSICAL TELEMETRY



New pigeon tracking system, developed for the Office of Naval Research, includes miniature transistorized transmitter which can be attached to the pigeon and which will emit a readily identifiable radio signal when the pigeon is in flight. The flight course of the pigeon is then plotted by tracking stations set up at several locations. The 2½ oz package, probably the largest payload successfully carried by a pigeon, consists of a 140-Mc crystal controlled oscillator driving a transistorized amplifier which delivers approximately 1-mw of RF power to a modified half wave dipole antenna. Four mercury cells give the unit a continuous operating life of at least 20 hours.—*American Electronic Laboratories, Inc., Richardson Rd., Colmar, Pa.*

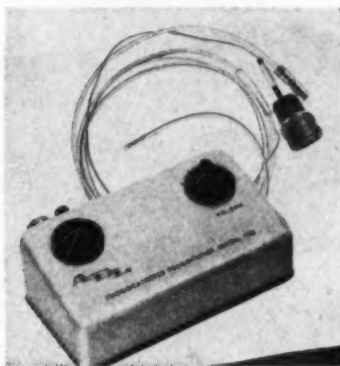
CIRCLE 105 ON READER-SERVICE CARD

X-RAY IDENTIFICATION

New X-Rite Radio-Opaque Label tape enables permanent, positive X-ray identification. Labels are prepared by typewriter, addressograph plates or ball point and reproduce full information directly on finished plate. Self-adhering backing eliminates sliding or misidentification.—*X-ray Identification Corp., 17110 Hartwell, Detroit, Mich.*

CIRCLE 104 ON READER-SERVICE CARD

INTRACARDIAC PHONOCATHETER



New Model 191 Single Lumen Phonocatheter (approx 2 mm dia or #5 French) for acoustical pickup and Model 192 Double Lumen Phonocatheter (approx 3-mm dia or #8½ French) for acoustical pickup and pressure and/or fluid samples enable clinician and researchers to acquire data almost impossible to attain previously. Model 190 self-powered Preamplifier for use with these phonocatheters feeds any standard ECG equipment for permanent records.—*American Electronic Laboratories, Inc., Richardson Rd., Colmar, Pa.*

CIRCLE 107 ON READER-SERVICE CARD

TISSUE HOMOGENIZERS



New stainless steel shaft pestles have Teflon tips that match contour of precision bore glass homogenizing tubes, are notched to fit Quick Change Chuck. Homogenizing by shearing action as tube is pushed up and down revolving pestle. Flexible drive, foot switch control on motor.—*Tri-R Instruments, 144-13 Jamaica Ave., Jamaica 35, N. Y.*

CIRCLE 108 ON READER-SERVICE CARD

Personal Radiation Monitor

Fountain-Pen Sized Model PRM-253 "Chirpee" . . . features visual and audible warning signals. . . . Under normal background conditions, "Chirpee" will flash and chirp once every minute or two. In a field of 10 MR/hr, the rate will increase to about four times a second. The rate increases with radiation intensity until a saturation

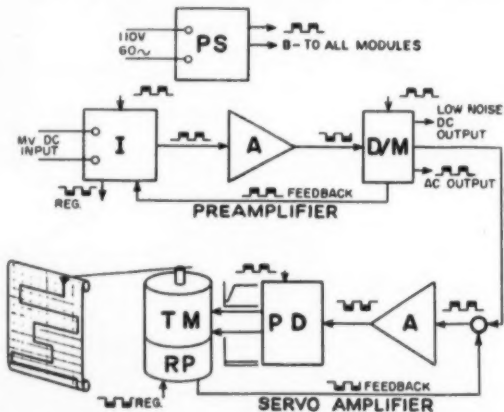


rate of 3,000 to 4,000 flashes per minute is reached in fields of 1 to 10 R/hr. . . . An important characteristic of the monitor is the ability to maintain the alarm signals even when the radiation level has drastically exceeded the upper limit of its dynamic range of indication. Tests have shown that the saturated alarm rates that are reached between 1 and 10 R/hr are maintained as the intensity rises to at least 3×10^6 R/hr. Model PRM-253 is a continuous monitoring system. It has no "on-off" switch. This eliminates the danger of having the monitor accidentally in the "off" position at a critical moment. . . . (From new Bulletin 253, Atomic Accessories, Inc., Subs. Baird-Atomic, Inc., 811 W. Merrick Rd., Valley Stream, N. Y.)

FOR THIS LITERATURE CIRCLE 109 ON READER-SERVICE CARD

Potentiometer/Receiver Recorder

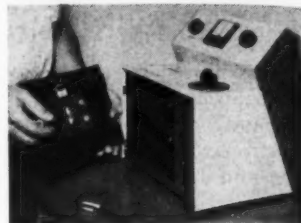
Input to the Potentiometer-Recorder may be any DC millivolt signal starting at 0.5 mv. The measuring device may be a strain gage, resistance bulb, thermocouple or any other device that develops a DC signal proportional to the process variable being measured. The Receiver-Recorder (no Preamplifier) handles DC inputs upwards



from 0-1 volt or 0-100 microamperes. The Millivolt Input Module (I) compares the input signal to a square wave feedback voltage from the Demodulator-Modulator (D/M) which is inductively coupled to the input and synchronously rectified. The voltage difference, or "error signal," is chopped to form a 3000 cycle square wave which is suitable for drift-free amplification. The novel inductive coupling design provides DC isolation at the Millivolt Input Module, thereby eliminating random noise pickup. . . . The AC Amplifier Module (A) is a high gain carrier amplifier. It feeds a phase sensitive Demodulator Modulator (D/M) which produces a low noise DC output and a square wave output signal. Both signals represent an accurate measure of the signal input. The DC signal can be used for retransmission to a logger or computer. The square wave output signal makes possible the DC isolation feature in the Millivolt Input Module. . . . Square wave input from the D/M unit and square wave feedback from a rotary transformer are balanced against each other. If a difference exists, there is an AC error voltage which is amplified by the AC Amplifier Module (A). This feeds the Pen Drive Amplifier (PD) which causes a flow of current to one motor winding or the other to develop upscale or downscale torque. . . . (From 4-page Bulletin R-311A, De Var Systems, Inc., Div. General Kinetics Corp., 494 Glenbrook Rd., Glenbrook, Conn.)

FOR THIS LITERATURE CIRCLE 110 ON READER-SERVICE CARD

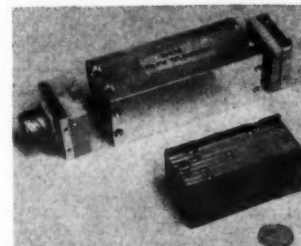
DOSIMETER READER



New accessory equipment allows rapid conversion of any Turner Fluorometer to read ionizing radiation dose. Reading requires less than 1 minute; silver-activated glass dosimeters are not treated or altered by measurement, may be preserved. Dosimeter holders (two models) mount on standard door of Model 110 Laboratory Fluorometer or Model 111 Self-Balancing and/or Recording Fluorometer. Range of reader using silver-activated glass rods is 10 to 100,000 roentgens from Cobalt 60 radiation; glass plates provide range of 2 to 30,000 roentgens from Cobalt 60 radiation.—*G. K. Turner Associates, 2524 Pulgas Ave., Palo Alto, Calif.*

CIRCLE 111 ON READER-SERVICE CARD

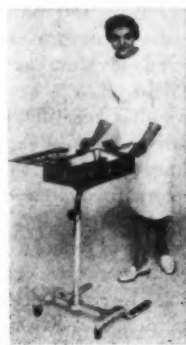
PHYSIOLOGICAL TELEMETRY



New "MIDAS" (Miniature Data Acquisition System) real-time FM/FM, multi-channel telemetry system senses and transmits respiration rate, heartbeat, pressure, strain, acceleration, etc. FM/FM mode of operation allows accurate noise-free reception of multi-channel signal. Three-channel transmitter is 1¼" x 1¼" x 6" weighs 9 oz. Multi-channel receiver and recorder are available.—*Unilectron, Inc., 129 Binney St., Cambridge 42, Mass.*

CIRCLE 112 ON READER-SERVICE CARD

SURGICAL/TREATMENT STAND

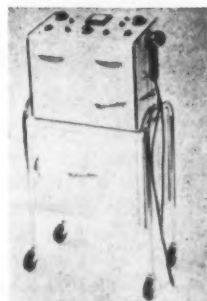


New adjustable, multi-purpose surgical and treatment stand (designed by Dr. J. A. Malerich, Jr., of West St. Paul, Minn.) is fabricated of stainless steel. Versatile tray rests on base that raises or lowers; stand moves easily for bedside, O. R., office use —replaces 10

pieces of standard hospital equipment.—*Wilson Mfg. Co., Columbus, Ga.*

CIRCLE 113 ON READER-SERVICE CARD

COMBINATION ELECTRICAL MUSCLE STIMULATOR/ ULTRASOUND



New Medco-Sonlator (patented) provides complete facilities for combination, or independent use, of electrical muscle stimulation and ultrasound in one convenient cabinet. Use of electrical muscle stimulation and ultrasound, simultaneously applied through the same sound head applicator, offers diagnostic as well as combination therapy not possible with either therapy individually.—*Medco Electronics Co., Inc., 3601 E. Admiral Place, Tulsa, Okla.*

CIRCLE 114 ON READER-SERVICE CARD

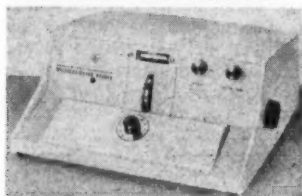
HEART-SYSTEM TAPE RECORDINGS



New FR-100B general-purpose instrumentation Recorder/Reproducer, fitted with tape-loop adapter, has application in medical research for correlation analysis and averaging responses of nerve action potentials. Also, new CP-100 portable instrumentation Recorder/Reproducer offers true instrumentation quality and performance equaling that of laboratory recorders for medical research.—Amper Corp., 934 Charter St., Redwood City, Calif.

CIRCLE 115 ON READER-SERVICE CARD

DOSIMETER READER



New Microdosimeter Reader measures X-Ray, Gamma, or high energy Electron radiation in less than 30 sec from 10 to 10,000 rads within $\pm 4\%$. Special reader records changes in fluorescence which occur in 1 x 6 mm Microdosimeter Rods due to high energy radiation exposure. Reader is specifically designed to hold and measure Microdosimeter Rods, eliminating rod chipping. Catalog D-299.—Bausch & Lomb, Inc., Rochester 2, N. Y.

CIRCLE 116 ON READER-SERVICE CARD

ELECTRONIC TONOMETER



New Mackay-Marg Tonometer is gentle and fast, can be used without anesthetics, eliminates hazard of transferring infectious eye diseases from one patient to another, provides permanent graphic record of intraocular pressure, may be used in any orientation, unit consists of probe and amplifier-writer connected by flexible cable. Probe of short penlight size is covered at one end by thin, disposable rubber membrane which is momentarily applied to the cornea. Amplifier-writer provides series of brief tonograms from which intraocular pressure is read. Response is linear. Normally 1 mm on graph equals 2 mm Hg of pressure. The scale ratio may be either increased or decreased by a switch. Amplifier-writer is adaptation of standard bridge, carrier-amplifier strip-recorder which may be adapted.—Biotronics, Inc., Financial Center Bldg., Oakland 12, Calif.

CIRCLE 117 ON READER-SERVICE CARD

HEMOFUGE

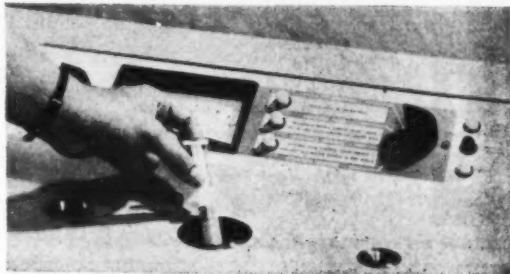


New Hemo.fuge blood bank centrifuge provides rapid, accurate system for typing and cross-matching tests. (Coombs cross matching in 3 minutes.) Unit has million-start timer, splash-guard shield, non-skid mounting pad.—Macbick Co., 243 Broadway, Cambridge, Mass.

CIRCLE 118 ON READER-SERVICE CARD

Blood Volume

The Volemetron is a new automatic instrument designed for accurate determinations of blood volume with results immediately available. The all-transistor computer circuits calculate blood volumes, correcting for residual



activity in syringe following injection and for environmental background radiations. Prepackaged doses, supplied in disposable syringes, and expandable sample tubes eliminate the need for laboratory facilities and special glassware. . . A known trace quantity of radioactively-labeled material is injected into the blood stream. When this material has been evenly mixed in the circulation, a blood sample is obtained and its radioactivity determined. Knowing the amount injected and the amount in the sample, the volume in which the material has been diluted can be calculated.

This is expressed mathematically in the following equation:

$$B.V. = \frac{D_T - D_R}{S_{postmix} - S_{premix}} \cdot V_s$$

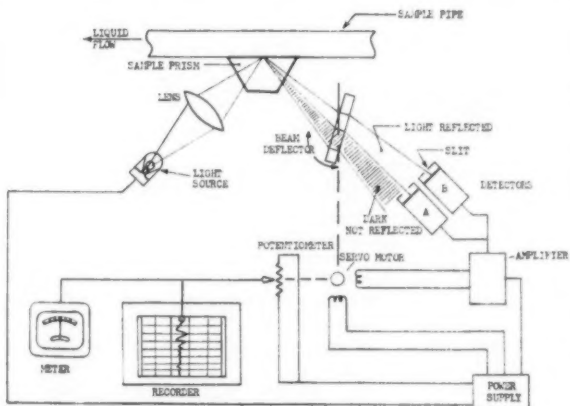
where, D_T = total dose to be injected
 D_R = dose residue after injection
 $S_{postmix}$ = sample withdrawn after injection and mixing
 S_{premix} = sample withdrawn before injection
 V_s = volume of the withdrawn samples . . .

(From 4-page bulletin, Atomium Corp., 940 Main St., Waltham, Mass.)

FOR THIS LITERATURE CIRCLE 119 ON READER-SERVICE CARD

In-Line Refractometer

The In-Line Refractometer is designed for those process stream applications where the liquid stream is very dark, extremely viscous, contains a large quantity of solid material or must be held at a high temperature or pressure



in order to prevent an adverse reaction such as polymerization, crystallizing or freezing . . . A light beam from an incandescent lamp is directed through a lens and out the back of the explosion-proof housing to a prism which is in contact with the sample . . . The light beam is refracted at the interface between the prism and the process fluid and directed back through a beam deflector to two cadmium sulphide photocell detectors. One photocell is located in the pure white light section while the other is mounted at the critical angle point where the beam changes from light to dark . . . As the refractive index of the process fluid changes, the critical angle changes and causes more or less light to fall on the one photocell detector. The other cell, of course, remains always in the full intensity portion of the beam. In order to achieve high stability and sensitivity a null balance system is used. As the light changes on the detector cell a signal is generated by the photocells and conducted to the amplifier. The amplified signal causes a servo motor to drive a glass deflector plate in the beam. As the plate moves, the beam is returned to the optical null position and the amount of movement of the glass is a measure of the process stream concentration. A helipot is geared to the null balancing motor. A signal from the helipot is conducted to the meter and a remote recorder if desired . . . (From 6-page booklet, Waters Associates, 45 Franklin St., Framingham, Mass.)

FOR THIS LITERATURE CIRCLE 120 ON READER-SERVICE CARD

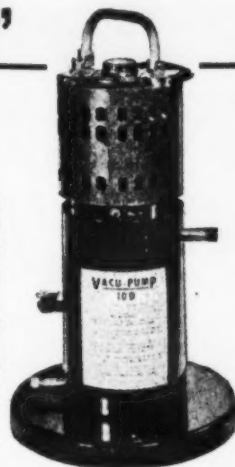
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NEW Portable Laboratory HIGH VACUUM PUMP

High Efficiency Pumping Capacity • Free Air Displacement 50 L. Per Min. • Quiet Operation • Portability • Economy of Operation • Absolute Pressure 0.1 Micron

DESIGN FEATURES UNIQUE TO THE VACU-PUMP: Carry handle on supermount for easy portability. Insulation and rubber mountings to eliminate noise. New vertical design, without belt and pulley, reduces operator hazard, makes pumps leak-proof, requires a much smaller volume of oil per charge. In filling the pump, oil is not introduced at the point of discharge, making it unnecessary to disconnect pump.



SPECIFICATIONS:

Absolute Pressure	0.1 MICRON	Diameter	12 inches
Pumping (Displacement, Speed)	50 LITERS/MIN.	Weight	45 lbs.
Inlet Tube	1/2" O.D.	Motor	1/2 H.P.
Operating Speed	1140 RPM	Voltage	115
Oil Charge Required	1 Pint	Amperage	4.4
Height	21 inches	Cycles	50/60

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CIRCLE 14 ON READER-SERVICE CARD

MEDICAL ELECTRONICS PRODUCT DEVELOPMENT MANAGER

An opening has recently been created on our corporate product development staff for a man with the right medical electronics background to assume duties as a Product Development Manager. Ideally, the man selected should be an M.D. with a Bachelor's or advanced degree in physics; however, other suitable academic training will be judged on individual merit. Duties will include: Selecting new medical electronic equipment, coordinating and consulting with surgeons, hospital administrators, etc., determining market potential for new products, and negotiating price structures. This position offers a challenging future for a candidate with top management potential. Send replies to: R. V. Seaman, Jr., Director of Personnel, American Hospital Supply Corporation, 1740 Ridge Avenue, Evanston, Illinois.

CIRCLE 15 ON READER-SERVICE CARD

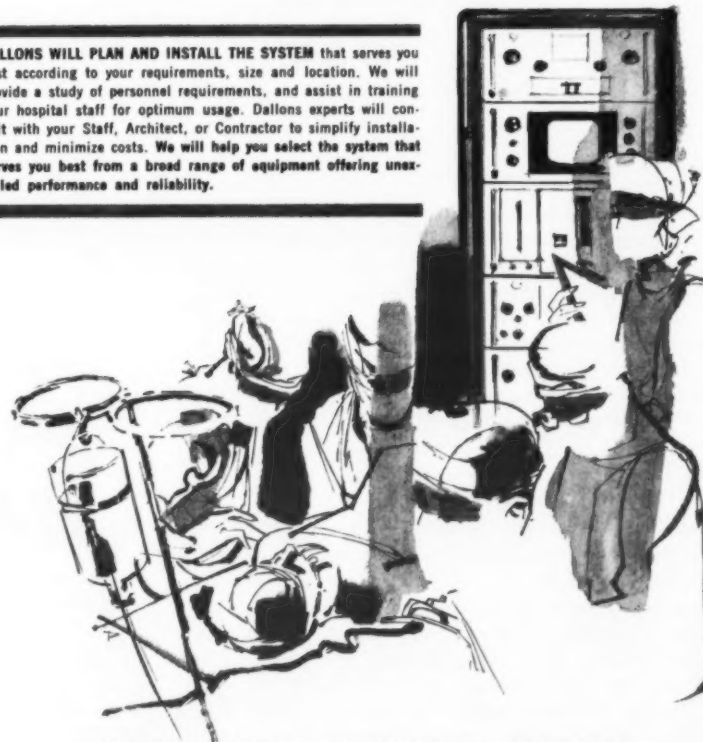
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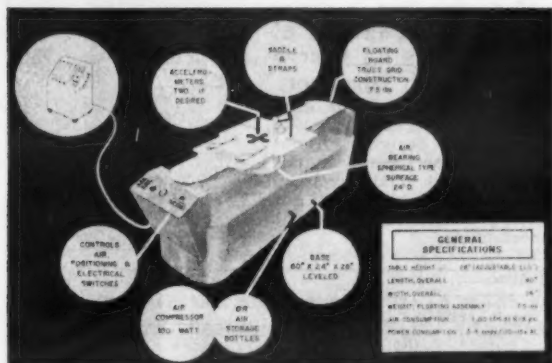
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CIRCLE 137 ON READER-SERVICE CARD

Ballistocardiograph

A new Ballistocardiograph for diagnosis of heart ailments records body vibrations caused by the heart's muscular action and resultant blood flow. . . . The resultant data is recorded graphically; the height of peaks and intervals of the recorded curves as registered on a strip-chart recorder are indications as to how the patient's



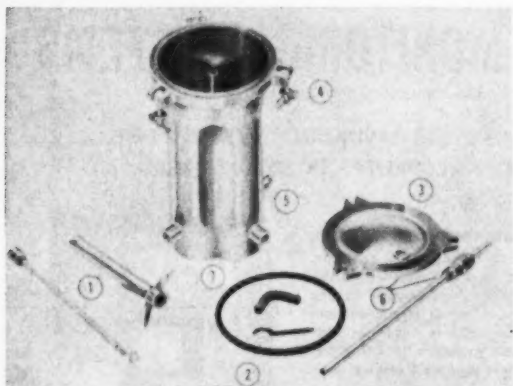
heart is functioning. . . . The principal problem inherent in measuring micro-accelerations is "external disturbance," which must be isolated if accurate recordings are to be made. . . . The patient undergoing examination floats on a bed-like table which is supported by a frictionless air bearing and which utilizes sensing accelerometers.

Accelerometers used in the ballistocardiograph are of the type employed in stabilized platforms for long range ballistic missiles. Their function is to convert vibrations of the patient's body into electrical impulses which are fed into a recorder. Two accelerometers are used in recording the movements of the body caused by the beat of the heart, one for the head-to-toe and the other for the shoulder-to-shoulder movement of the patient. A multi-channel recorder indicates the cardiac cycle as measured by the instrument. A single air bearing is beneath the center of gravity of the "floating" table on which the patient lies. . . . (From news release, Belock Instrument Corp., 112-03 14th Ave., College Point, N. Y.)

FOR THIS LITERATURE CIRCLE 125 ON READER-SERVICE CARD

Aseptic Dispersall

Pathologists, virologists, bacteriologists, clinicians and the bioengineers who design production plants for vaccines, toxoids and the like will appreciate the speed, convenience and efficiency of the Waring Aseptic Dispersall[®] (Model AS-1), designed for the safe reduction and dispersal of infectious materials while prohibiting the escape



of pathogens into the surrounding air which would endanger human life. The Aseptic Dispersall eliminates the leakage of aerosolization of the infectious material which was once the prime hazard to the laboratory worker.

Teflon bearings are used throughout the "stand pipe" leak-proof agitator. An "O" ring gasket insures the leak-proof quality of the special designed lid held in position by three swivel thumb-screws. Provision for continuous flow of ingredients is made by "Inlet" and "Outlet" fittings to the mixing chamber of the container. Ingredients may also be drawn off hypodermically or by vacuum through the aspirator tube built into the lid.

To obviate degradation by heating of the infectivity of the materials being processed, the base of the container is jacketed for temperature regulation. This jacketing for temperature control affords a higher recovery of the pathogen. Conversely, this investment cast jacketing may also be used where the application of heat to other than biological ingredients is required. . . . (From data sheet, Waring Products Corp., 25 W. 43rd St., New York 36, N. Y.)

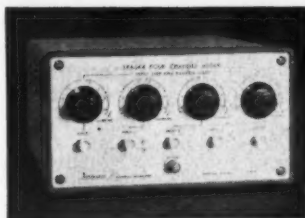
FOR THIS LITERATURE CIRCLE 126 ON READER-SERVICE CARD

For More data on Products
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for sophisticated performance—

in stimulus
pulse generation:



CIRCLE 16 ON READER-SERVICE CARD

LRG 051 Triple Function Generator. 100 seconds to 10 microseconds square, delayed, and sawtooth waveforms.

in complex waveform generation:

LRA 044 Four Channel Adder. Summates algebraically up to four waveforms, modifies their amplitude, and will reverse their phase at the will of the investigator.

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LRA 047 Power Amplifier. For wideband low impedance stimulation in volume and transdermal excitation of up to 100 volts amplitude.

Part of the family of Argonaut modular Biomedical instrumentation; custom quality at modest cost.

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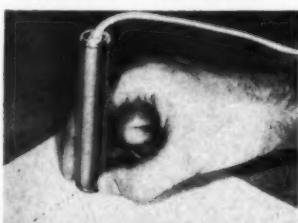
HEMATOCRIT



New Model 33 Hematocrit produces speeds of over 13,000 rpm; head can be brought from top speed to dead stop in approx 30 sec; results can be examined in minimum time. Unit accommodates variety of sizes of micro-tube heads and micro-chemistry heads and accessories. Pilot light indicates when centrifuge is operating; safety switch prevents operation unless cover is closed. High-speed, ball-bearing motor is shock-mounted and grease-sealed for life, requires no maintenance. Custom-designed fan provides smooth air flow in housing. Built-in automatic timer shuts off operation at end of any preset period from 0 to 15 minutes. Bulletin 326A.—Chicago Surgical & Electrical Co., 3070 W. Grand Ave., Chicago 22, Ill.

CIRCLE 127 ON READER-SERVICE CARD

IMPULSE RECORDER



New CXC Impulse Recorder marks electric impulses when moved over paper by operator, producing accurate, visible check of fractional-second timing in electric or electronic equipment. Impulse marks at rate of 120/sec are counted to determine exact time; recorder time range is from 1/60 to 2 sec. Unit eliminates necessity of taking and developing actual "spinning top" radiographs of X-ray equipment to check, or set, radiographic timer.—Continental X-Ray Corp., 1536 Clybourn Ave., Chicago 10, Ill.

CIRCLE 128 ON READER-SERVICE CARD

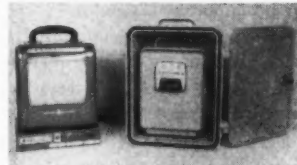
CARDIODYNAMETER



New Cardiodynameter for physiological measurements can be used to provide valuable information in functional diagnosis of heart and circulatory diseases. May be used for pulse oscillography, digital plethysmography and precordial displacements. Pressure-capacitance diaphragm pickup with ionization transducer tube (T42) efficiently converts minute volume pulsations into electrical signal. Output can be read directly or fed to oscilloscope, optical oscillograph or direct writing recorder. Special valve system allows use at elevated pressures.—Decker Corp., 45 Monument Rd., Bala-Cynwyd, Pa.

CIRCLE 129 ON READER-SERVICE CARD

PORTABLE OZONE RECORDER



New Model 725-3B Portable Ozone Recorder measures and records ozone concentrations on 6" strip chart; is used in air pollution, industrial hygiene, weather and agricultural studies. Operation based on highly efficient Micro-Coulomb Sensor. Weatherproof case allows remote stationing of Ozone Meter with Recorder positioned for observation. Operating range is 0 to 100 pphm/volume, sensitive to $\pm 2\%$ of full scale. Sampling rate, approximately 140 cc/min; response time, 75% of true value in 1 min; unattended operating time, approx 3 days.—Mast Development Co., Inc., 2212 E. 12 St., Davenport, Iowa.

CIRCLE 130 ON READER-SERVICE CARD

EMG MUSCLE TRAINER



New transistorized Model MT EMG Muscle Trainer is small enough for patient to carry while undertaking muscle rehabilitation. Audio output to built-in loudspeaker or earphone detects muscle action potentials too minute to cause any visible movement, encourages patient to keep working, focus efforts on right muscle, and speed up his ultimate rehabilitation.—Meditron Co., Div. Crescent Engr. & Research Co., 5440 N. Peck Rd., El Monte, Calif.

CIRCLE 131 ON READER-SERVICE CARD

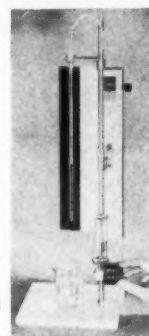
VITAL HEART TISSUE DETECTOR



New Conduction System Locator minimizes chances of surgically induced heart block, consists of electronic depth probe affixed to "tone box." When pencil-shaped probe is passed over ventricular septum, tone changes pitch as contact is made with "bundle of His." By moving probe back and forth across area, tone-changes trace location of vital heart tissue with accuracy of 1 mm at depths to 4 mm. Detection system works as well on arrested heart as on beating heart. Meter on "tone box," which is used to zero instrument before use, also indicates changes in relative conductance of tissue.—Meditron, Inc., 3055 Hwy. 8, Minneapolis 18, Minn.

CIRCLE 132 ON READER-SERVICE CARD

ILLUMINATED PIPETTER



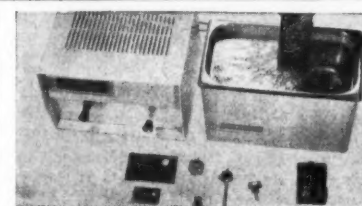
New Rapid-Saf Pipetter eliminates mouth pipetting, permits one-hand operation with fingertip micrometer control. Safely dispenses from 1 microliter to 20 microliters of liquids (acids, alkalis, poisons, radioactive solutions), accommodates pipettes of different capacities by speedy, vertical adjustments. Decants or draws off liquids by turning dual-knob counter-clockwise. Full-length, concealed incandescent tube casts soft glow on back panel. Bulletin 158.—Labline, Inc., 3070 W. Grand Ave., Chicago 22, Ill.

CIRCLE 133 ON READER-SERVICE CARD

LINT-FREE GLOVES

New protective Gloves of lint- and fiber-free materials are impervious to hand perspiration, oils; prevent physical and chemical contamination. Sturdy, washable, touch sensitive, snug, ventilated. Type 863 has coated palm; Type 865 has coated palm, index and little finger.—Victor Gloves, Inc., 49 E. 21 St., New York 10, N. Y.

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320	5 gal.	14" x 10" x 6" D	\$ 499.95	\$ 675-1040
820	13 gal.	20" x 16" x 10" D	\$ 999.95	\$1325-1750
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DESERT SAND						
WHEAT VEL.						
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CIRCLE 228 ON READER-SERVICE CARD

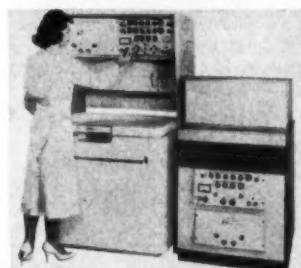
PROJECTION MICROSCOPE



New Project-O-Scope projection microscope provides magnifications up to 1500X with optional oil immersion objectives; is ideal for group viewing, screen images of prepared slides, micro-organisms in liquid; projection of table-top images for tracing, observation of living cultures of protozoa, etc. Simple changeover from projector to microscope. Stage may be horizontal or vertical; magnification increases or decreases by interchanging standard objective or eyepiece.—National Instrument Co., Inc., 4119-4127 Fordleigh Rd., Baltimore 15, Md.

CIRCLE 138 ON READER-SERVICE CARD

LIQUID SCINTILLATION SPECTROMETERS



New Tri-Carb Spectrometers used in counting and analysis of radio-isotope tracers in chemical and biological research, include 3 new models in 3 series for both semi-automatic and automatic sample changing, and for either refrigerated or non-refrigerated operation. Improved design provides two separate channels of pulse-height analysis, with individually variable electronic amplifications and four adjustable discriminator levels, permitting simultaneous counting of two isotopes in a mixture with optimum balance-point operation for each and interchangeable counting of assortments of tritium and carbon—14 samples without readjusting instrument between samples.—Packard Instrument Co., Inc., Box 428, La Grange, Ill.

CIRCLE 139 ON READER-SERVICE CARD

RADIATION ANALYZER FOR CIRCULATORY PHENOMENA

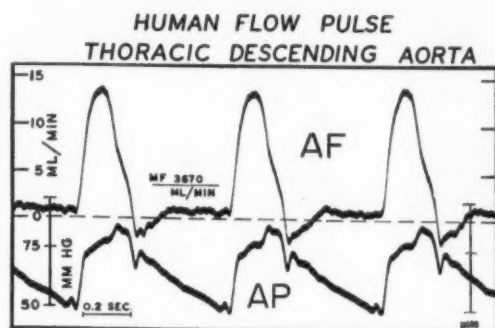


New Nuclear Events Dynamic Analyzer (NEDA) is being used to study dynamic human circulatory phenomena, such as diagnosis of coronary disease. Dual-channel system functions as two complete Pulse Height Analyzers, including two external scintillation detector assemblies; two scalars, either single cycle or automatic recycle, with either preset time or preset count modes of operation; Digital Ratiometer; two Digital-to-Analog Converters; stepwise serial Scanning Spectrometer; and several complex, special-purpose measuring systems produced by combining these functions. Accuracy of ± 1 nuclear count per measurement interval. System allows either integral counting of isotope activity, with rejection of all background and signal below selected baseline value, or Narrow or Wide Window counting of selected spectrum pass-bands for all applications.—Solid State Nuclear, 6007 Washington Blvd., Culver City, Calif.

CIRCLE 140 ON READER-SERVICE CARD

Square-Wave Flowmeter

The Square-Wave Electromagnetic Flowmeter has been developed as an extremely useful tool for use by the research physician or surgeon in the physiological area of measurement of blood circulation. The Flowmeter will measure volumetric blood flow through any surgically exposed artery or vein, whether cannulated or non-cannulated.



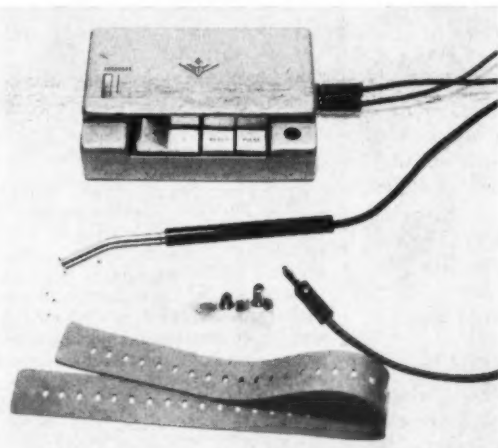
As a research instrument it has found its greatest use in providing needed data concerning drug effects, transplants, vascular anomalies, surgical evaluations, and monitoring extra-corporeal systems. Its usefulness as an instrument of research has only begun. . . . Connections are normally provided for using any standard direct-writing or optical recorder to produce a permanent chart. Model 201 Flowmeters have a single output with provisions for recording either pulsatile (Phasic) or mean flow. Model 202 Flowmeters have dual outputs for recording simultaneously pulsatile and mean flow characteristics from a single probe. Probes are presently available in non-cannulating or "surgical" types, chronic implantation types, and cannulating types for extracorporeal circulations. In the "surgical" types, available sizes fit arteries or veins from 5 mm to 100 mm outside circumference. Extracorporeal sizes are for $\frac{1}{2}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ " internal diameter tubing. . . . (From 4-page bulletin, Carolina Medical Electronics, Inc., 255 Stanton Dr., Winston-Salem, N. C.)

FOR THIS LITERATURE CIRCLE 141 ON READER-SERVICE CARD

Reaction Degeneration Scanner

By definition, the failure of a muscle to contract when its motor point is stimulated with a current of adequate strength and a duration of 1 msec indicates denervation. In denervated muscle, chronaxie values 50 to 200 times that of normal muscle are found.

The determination of these chronaxie values is time



consuming and formerly required transporting the patient to a hospital or university department of physical medicine. The Reaction Degeneration Scanner (All American Engineering Co., Lancaster Ave. and Center Rd., Wilmington, Del.) now affords the examiner a quick bedside method and device for ruling out peripheral nerve lesions. Based on the increase in duration of stimulus in denervated muscle, the scanner has been designed to provide a rectangular output pulse of 0.5 and 0.9 msec duration with a fast rise and fall time and a variable intensity of the stimulus. The normal side is examined first and the pulse duration and voltage needed to elicit a contraction are compared with the muscle suspected of denervation. Failure to respond to a 0.9-msec pulse indicates denervation. . . . Abstracted from a paper by Arthur J. Heather, M.D. (School of Medicine, University of Pa., Phila.; Medical Director, Eugene du Pont Hospital and Rehabilitation Center) and Martin A. Apostolico, Jr., B.S. (Project Electronics Engineer, All American Engineering Co.), reprinted from "Archives of Physical Medicine and Rehabilitation," Vol. 40, August 1959, American Congress of Physical Medicine and Rehabilitation.

FOR THIS LITERATURE CIRCLE 142 ON READER-SERVICE CARD



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Provides the means of isolating a stimulator pulse from ground reference to reduce ground loop artifacts.

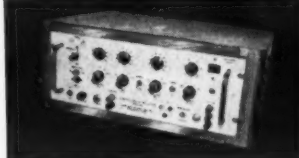
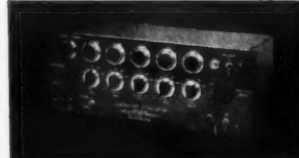
PHOTIC STIMULUS ACCESSORY . . . Model 127
Provides source of short duration light flashes at three intensities and at repetition rates controlled by stimulator.



WRITE for detailed literature on each of the above instruments and accessories.

American Electronic Laboratories, Inc.

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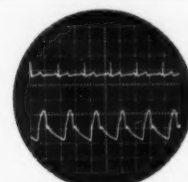
Model 198 . . . \$95.
Classroom and research laboratory useModel 751 . . . \$145.
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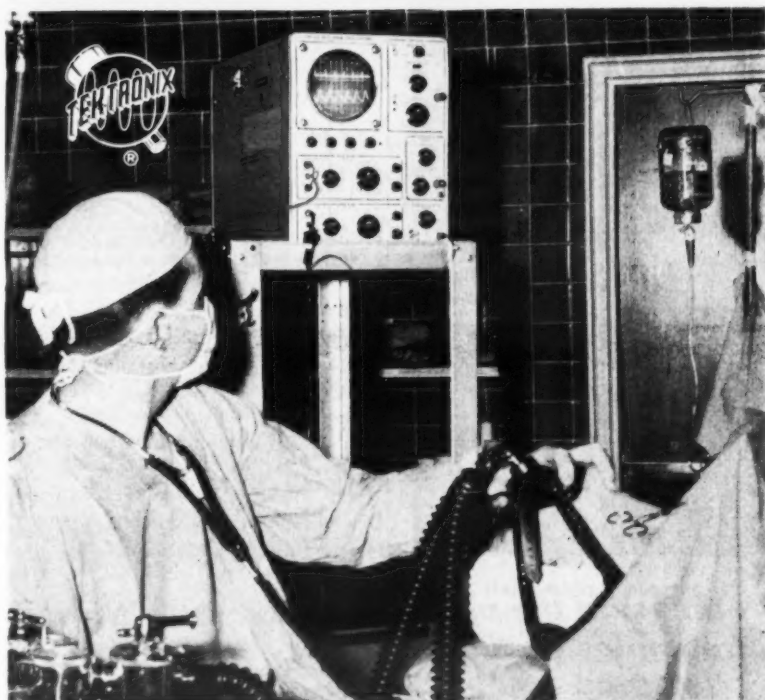
Tektronix

DUAL-BEAM OSCILLOSCOPE

meets many unusual requirements



Anesthesiologist observing blood pressure and ECG waveforms of patient during surgery—on full 8-centimeter by 10-centimeter display area of Tektronix Type 502 Oscilloscope—at North Carolina Memorial Hospital, Chapel Hill, North Carolina.



For patient monitoring, the proved Type 502 Oscilloscope offers bright dual-beam displays with excellent definition. With few front-panel controls and connectors—and all components coordinated toward simple operation with dependable performance—the Tektronix Type 502 Oscilloscope ideally suits a wide variety of medical applications . . .

Type 502 performance characteristics include: calibrated vertical sensitivity in 16 steps from 200 μ V/cm to 20 V/cm, both beams, calibrated sweep range in 21 rates from 1 μ sec/cm to 5 sec/cm, constant input impedance and differential input at all sensitivities. Other Tektronix features include: flexible trigger facilities, 2X, 5X, 10X, or 20X sweep magnification, amplitude calibrator, electronically-regulated power supplies.

Type 502 Dual-Beam Oscilloscope (f.o.b. factory) . . . \$825

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Measure the pH of samples as small as 0.05 ml . . .

. . . with L&N's rugged miniature pH electrode assembly. In microbiology, biomedical research or diagnostic work, the unique features of these electrodes are gaining wide acceptance. They include: the ability to measure samples as small as 0.05 ml (about the size of a single drop); wide pH range of 1 to 11.5; temperature range of 15 to 40 C; rapid response of a few seconds; rugged construction; and low cost (the 124138 Miniature pH Electrode Assembly is only \$38.00, f.o.b. Phila. or North Wales, Pa.).

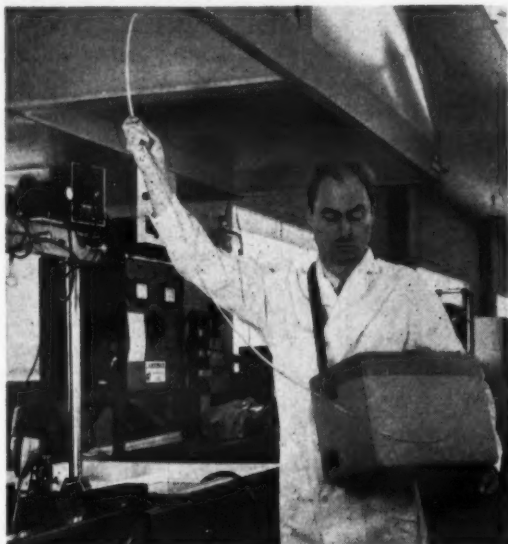
Need more information? Write for Data Sheet E-96(3) from Leeds & Northrup Co., 4930 Stenton Ave., Phila. 44, Pa.



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CIRCLE 26 ON READER-SERVICE CARD

Gas Sensing Device

A new type of electronic instrument for detecting trace quantities of gases . . . the OLFACTRON . . . aids medical and operating personnel at missile installations, testing sites, and propellant manufacturing plants, by increasing safety in operations involving propellants . . . In a manner similar to the human being sniffing the air, the

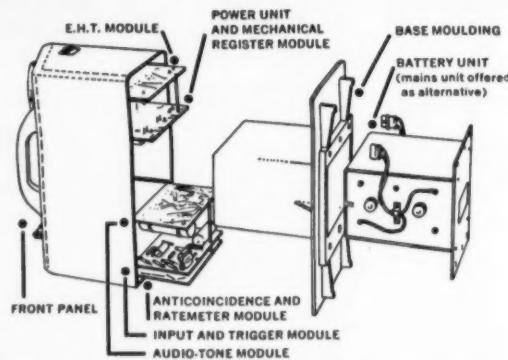


OLFACTRON draws air tinged with vapors into its inlet tube, and smells (or analyzes) the presence of particular substances . . . The vapor sniffed by the OLFACTRON's "electronic nostril" is almost instantly converted into an electronic signal which can sound horns, flash lights, turn ventilating systems on or off . . . (From 16-page Demonstration Report, American Systems, Inc., 1625 E. 126 St., Hawthorne, Calif.)

FOR THIS LITERATURE CIRCLE 143 ON READER-SERVICE CARD

Portable Radiation Monitor

Self-contained radiation monitor . . . upgrades field performance of decontamination and radiation safety teams. Though it weighs only 11 pounds, it does several big jobs . . . even in the hands of unskilled personnel.



Provides once-over checking of both alpha and beta contamination. Indicates combined radiation visually on a meter, and audibly through headphones or its built-in speaker in five seconds. Digitally counts alpha rates below 6/sec for any length of time. Detection is instantly switched from alpha/beta to alpha or beta only or digital counter for low levels. Uses common flashlight batteries. Adaptable, with power pack, to live current . . . (From 6-page brochure, Fairbanks, Morse & Co., Electronics Div., 100 Electra Lane, East Station, Yonkers, N. Y.)

FOR THIS LITERATURE CIRCLE 144 ON READER-SERVICE CARD

Hospital Ward Monitor

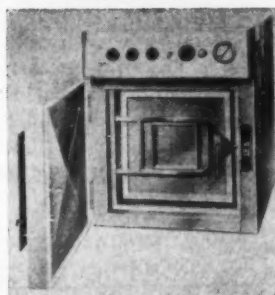


Whitehall Multiple Patient Monitor aids physician and nurse by freeing both from charting paper work routine and providing round-the-clock alarm monitoring for 32 or less patients simultaneously. Automatically monitored and recorded are patient condition variables of respiration rate, pulse rate, blood pressure, and body temperature . . . Alarm limits are personally prescribed by the patient's physician and are set easily, reliably by either doctor or nurse . . .

Fully calibrated before installation, providing medical data ranges and resolution meeting the highest medical research standards, Whitehall Ward Monitor 32 provides permanent 24-hour, 8 1/2" x 11" chart graph records for each of 32 patients. All hospital and research requirements for accurate records and data collection are thus satisfied and the data is ready for storage in standard record folders . . . (From 6-page brochure, Whitehall Electronics Corp., 1645 Hennepin Ave., Minneapolis 3, Minn.)

FOR THIS LITERATURE CIRCLE 146 ON READER-SERVICE CARD

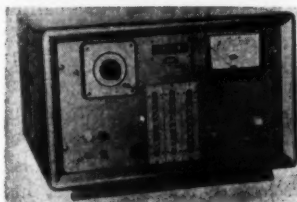
INCUBATOR



New Incubator for carbon dioxide and other oxygen-free incubating techniques, as well as laboratory applications such as paraffin embedding, has vacuum feature that provides for minimum usage of carbon dioxide once desired tensions have been attained. Tight seals maintain desired atmospheres up to 48 hr without addition of CO₂; temperature is controlled to $\pm 0.5^\circ\text{C}$.—National Appliance Co., 7634 S. W. Capitol Hwy., Portland 19, Ore.

CIRCLE 146 ON READER-SERVICE CARD

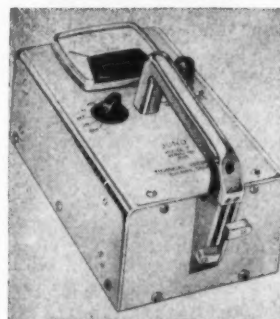
PRESET-COUNT SCALER



New Model DS-1AP high-speed decade Scaler for use with automatic sample changers registers one million counts per minute with counting periods of up to 55 minutes preset in automatic timer. Discriminator sensitivity and high voltage supply are adjusted to suit requirements of counting job. Any counting error due to tube or component failure in scaling circuit is automatically signaled by ambiguous indication in the strip. Input systems and power supply are provided for proportional, Geiger-Mueller, scintillation and neutron detectors.—Nuclear Measurements Corp., 2460 N. Arlington Ave., Indianapolis 18, Ind.

CIRCLE 147 ON READER-SERVICE CARD

SURVEY METER



New portable Model 7 Juno Survey Meter measures intensity of and discriminates between alpha, beta, and gamma radiation, and is used to protect personnel from over-exposure to radiation. Features sealed switch box and desiccant cartridge high impedance circuit, large open-face meter, and improved battery pack with over 800-hr operating life. Bulletin 180.—Technical Associates, 140 W. Providencia Ave., Burbank, Calif.

CIRCLE 148 ON READER-SERVICE CARD

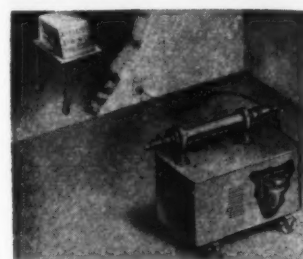
COLOR TV EQUIPMENT



Three new packages of essential equipment allow developmental stages in color TV for research, educational, and hospital programs. Package 1 includes basic equipment for producing color signals according to NTSC standards. Package 2 is supplementary, provides facilities for radio frequency transmission of encoded color pictures from transparencies. Package 3 of recommended equipment plus full facilities transmits, receives, monitors, and analyzes composite color pictures.—Telechrome Mfg. Corp., 28 Ranick Dr., Amityville, N. Y.

CIRCLE 149 ON READER-SERVICE CARD

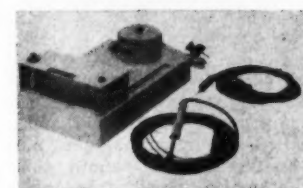
RADIATION SOURCES



Three new small radiation source machines include Monopulse Linear Accelerator (shown) no larger than office desk, capable of producing high intensity gamma radiation in short pulses; steady-state "Linac" of similar compactness and output; and small Cyclotron. Monopulse Linac produces gamma pulses singly or as frequently as 1/sec, has radiation intensity of 10 million roentgens/sec at energy levels of from 6 to 8 Mev. Steady-state Linac produces electrons ranging from 4 to 12 Mev, was designed for industrial uses such as pharmaceutical sterilization and radiographic inspection, sterilizes entire cases of medical supplies on production line basis. Cyclotron, patterned after instrument built for Pomona (Calif.) College, provides inexpensive source of short-lived radio-isotopes and means for performing activation analysis or other analytical techniques involving nuclear measurements.—Hughes Aircraft Co., Florence Ave., & Teale St., Culver City, Calif.

CIRCLE 150 ON READER-SERVICE CARD

THERMOCOUPLE GALVANOMETER



New Light Trace Galvanometer used for indicating temperature has light source and scale mounted on common base. Light source is single-filament lamp (accommodated in left scale support). Filament reflects on curved scale via concave mirror of measuring mechanism. Knob adjusts clarity of light trace. Thermocouples are adjusted to 10-ohm resistance. Temperature differences are found by calculation when measuring absolute temperature at both measuring points in quick succession. Compared to direct difference measurement, this method has advantage of permitting temperature to be read at both points.—Lafayette Instrument Co., N. 26 St. & 52 By-Pass, Lafayette, Ind.

CIRCLE 151 ON READER-SERVICE CARD

X-RAY AND EEG FREQUENCY RULERS



New No. B-95 X-ray Ruler (shown) for medical and scientific use is 2" wide x 18" long. One edge is divided in 16ths, other in millimeters with each centimeter line extended to inch scale, giving immediate comparison between English and metric scales. New FR59 EEG Frequency Ruler used in measuring brain waves registered on an Electroencephalogram is 3" x 8".—The C-Thru Ruler Co., 827 Windsor St., Hartford, Conn.

CIRCLE 152 ON READER-SERVICE CARD

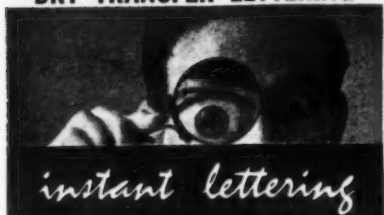
INCUBATOR



New molded plastic Incubator for laboratories, physicians and dentists weighs 2 lb., gives even heat distribution from plastic-coated heating grid. Thermostat is controlled at 98.6°F, uses 30 watts. Lift-lid allows easy access to incubated materials; strong plastic-dipped shelf has 88 sq in surface.—ANKH Labs, Inc., E. Dayton Dr., Fairborn, Ohio.

CIRCLE 153 ON READER-SERVICE CARD

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Industrial
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Versatile, reliable, the M-10 is suitable for many applications where low level DC amplification is required. May operate from either current or voltage source and provide either current or voltage output with proper shunts.

UTILIZE YOUR
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Recorder for
MANY NEW
APPLICATIONS
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The M-10 is ideal for use with 0-1 MA recorders. High output impedance prevents excessive damping. A trim adjustment is provided to calibrate the combination to 1/2%. Linearity is better than 1/2% for the amplifier. (Combination usage shown is with Esterline-Angus 0-1 MA Recorder)

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CIRCLE 22 ON READER-SERVICE CARD

Literature

For copies circle number on card

OXYGEN-AIR PROPORTIONER. 4-page Booklet NM-235.000 describes unit that meters precise amounts of oxygen and air, continually monitors pressures and flow rates.—National Cylinder Gas Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

CIRCLE 154 ON READER-SERVICE CARD

MEDICAL INSTRUMENTS. 8-page fold-out describes cardiac, physical therapy, and electrosurgical instruments.—The Birtcher Corp., 4371 Valley Blvd., Los Angeles 32, Calif.

CIRCLE 155 ON READER-SERVICE CARD

SONIC CLEANING. 4-page Bulletin MC-580 presents ultrasonic sterilizers with electronic control consoles.—Amsco Electronics, Div. American Sterilizer, 2424 W. 23 St., Erie, Pa.

CIRCLE 156 ON READER-SERVICE CARD

ULTRASONIC CLEANING. 4-page brochure describes cleaning systems for hospital instruments.—Branson Instruments, Inc., 37 Brown House Rd., Stamford, Conn.

CIRCLE 157 ON READER-SERVICE CARD

MICROANALYSIS. 4-page bulletin describes DEM 301 Electron Micro-analyzer which has 4 independent radiation channels.—Eliot Instruments, Inc., 430 Buckley St., Bristol, Pa.

CIRCLE 158 ON READER-SERVICE CARD

PHOTOMETER. 4-page bulletin describes Process Flame Photometer for measuring chloride ion content of boiler feedwater.—Waters Assoc., 45 Franklin St., Framingham, Mass.

CIRCLE 159 ON READER-SERVICE CARD

GAS ANALYSIS. 4-page Data Sheet 10.15-22 reports use of Electronik 15 Recorders and Integrators in monitoring C¹⁸O₂ in biochemical and metabolic studies.—Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Phila. 44, Pa.

CIRCLE 160 ON READER-SERVICE CARD

pO₂ MEASUREMENT. 4-page Bulletin S-160 describes Model 160 Physiological Gas Analyzer for in vivo measurement of pO₂ in blood, brain tissue, etc.—Beckman/Spinco Div., Beckman Instruments, Inc., Stanford Industrial Park, Palo Alto, Calif.

CIRCLE 161 ON READER-SERVICE CARD

pH MEASUREMENT. 8-page booklet describes equipment for pH stat, equipment for recording titrations, pH meters for research and control.—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, N. Y.

CIRCLE 162 ON READER-SERVICE CARD

pH, PCO₂, pO₂. 2 Bulletins describe systems that use Severinghaus pCO₂ electrode, Clark pO₂ electrode, and Sand's type pH electrode for rapid, accurate measurements in liquids and gases.—Instrumentation Laboratory, Inc., 108 Cummington St., Boston 15, Mass.

CIRCLE 163 ON READER-SERVICE CARD

pH METER. 4-page brochure describes Companion pH Meter accurate to within 0.05 pH, reproducible to 0.02 pH.—Coleman Instruments, Inc., 42 Madison St., Maywood, Ill.

CIRCLE 164 ON READER-SERVICE CARD

pH AMPLIFIER. Data sheet describes Model 350-3600 Amplifier that covers 0-14 pH range, readable and stable to ±0.002 pH units; uses conversion scale for pCO₂ measurement.—Sanborn Co., Medical Div., Waltham 54, Mass.

CIRCLE 165 ON READER-SERVICE CARD

BLOOD CELL COUNTER. Bulletins describe Automatic Blood Cell Counter and Cell Size Analyzer, and Model B Research Counter (over 5,000 cells/sec).—Coulter Electronics, Inc., 2525 N. Sheffield Ave., Chicago 14, Ill.

CIRCLE 166 ON READER-SERVICE CARD

OPTICAL DENSITY. 4-page bulletin describes Model 200 Optical Density Converter; 2-page data sheet presents Model 202 Optical Density Standards.—Gilford Instrument Labs., Inc., Oberlin, Ohio.

CIRCLE 167 ON READER-SERVICE CARD

PHOTOMETER. 4-page Bulletin P-203 describes why and how of pre-calibrated, colorimetric Photometer.—E. Leitz, Inc., 468 Park Ave., S., New York 16, N. Y.

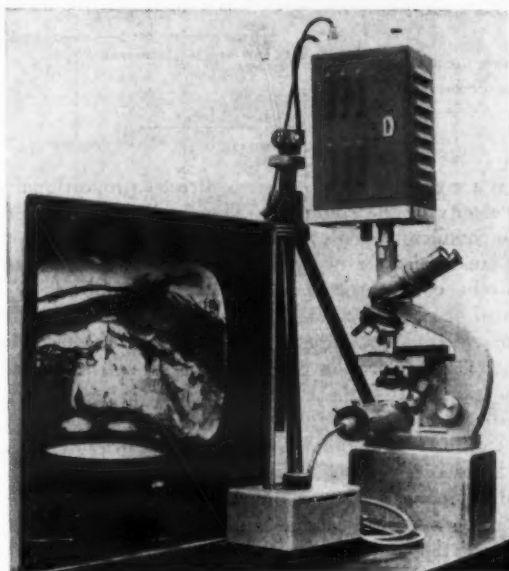
CIRCLE 168 ON READER-SERVICE CARD

SONIFIER. 2-page bulletin describes high intensity ultrasonic device for emulsifying and homogenizing cells, tissue and body fluids.—Heat Systems Co., 777 Northern Blvd., Great Neck, L.I., N. Y.

CIRCLE 169 ON READER-SERVICE CARD

Closed Circuit TV Microscope

"World's first closed circuit TV microscope system" unites high resolution TV system (DuMont) with high magnification Elgeet microscopes to provide new tool for hospitals, colleges, research centers . . . Among indicated



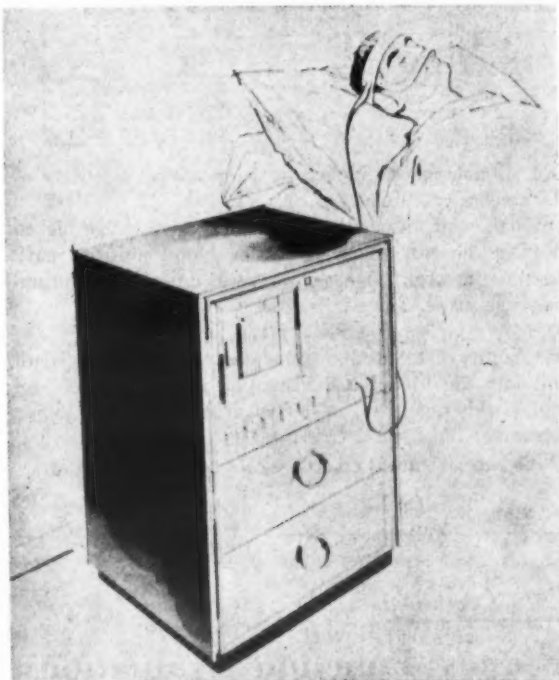
hospitals uses are location of the TV monitor in the Operating Room so that the surgeon may see tissue rushed to the Pathology Laboratory and placed on the microscope slide for simultaneous study by the pathologist and the surgeon's staff. The closed circuit microscope system supplements the existing closed circuit TV which follows operations for medical education purposes . . . System incorporates Research Trinocular Microscope with four objective lenses (4X, 10X, 40X, and 100X) with magnification on-screen up to 2,500X and 3,500X; 17" screen, 600-line resolution. Closed circuit TV microscopy brings into useful magnification specimens too small for highest power microscopes but too large for electronic microscopes which start performing at 5,000X magnifications . . . (From News Release, Elgeet Optical Co., Scientific Instruments Div., 838 Smith St., Rochester, N. Y.)

CIRCLE 170 ON READER-SERVICE CARD

FOR MORE INFORMATION ON TV SYSTEMS BY
DU MONT LABS., INC., 750 BLOOMFIELD AVE., CLIFTON, N. J.
CIRCLE 171 ON READER-SERVICE CARD

Body Function Recorder

The Honeywell Body Function Recorder is used by hospitals and clinics in intensive care areas, post-operative recovery areas, and other locations where it is essential to continuously monitor a patient's body functions. It measures and records pulse rate, diastolic and systolic blood pressures, body temperature, and respiration rate.



Body function data is measured and plotted on a Honeywell multipoint strip chart at the rate of five body functions every two minutes. An alarm system in the Body Function Recorder is set on individual body functions to indicate when either high or low limits have been exceeded. Transducers used with the instrument are interchangeable without special calibration . . . There is no electrical shock hazard in the transducers and an alarm operates if any transducers become disarranged, or any measuring circuits fail . . . (From 48-page Catalog G-10b, Minneapolis-Honeywell, Electronic Medical Systems, 5200 E. Evans Ave., Denver 22, Colo.)

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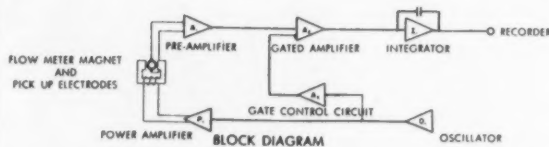
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CIRCLE 26 ON READER-SERVICE CARD

Measuring Blood Flow

The Medicon Microflo Blood Flowmeter employs Faraday's law of electromagnetic induction in conjunction with a gated sine-wave circuit. Basically, an emf is induced across a conductor (when the conductor is moved



across a magnetic field) which is directly proportional to the velocity of the conductor. The fluid stream (blood) is the conductor which flows through an electromagnetic field created by the two poles of the electromagnet. The Flo-Probe consists of an electromagnet, whose field is oriented at right angles to the line of flow, and a pair of pickup electrodes positioned in the magnetic gap to detect the emf induced by the fluid flowing through the vessel.

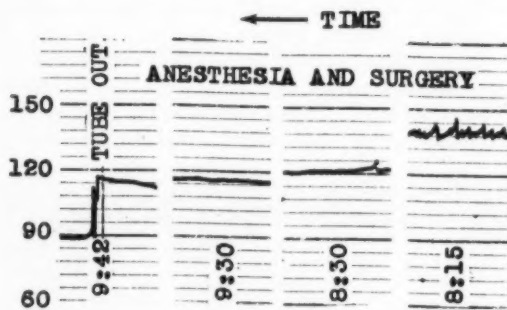
The signal from the Flo-Probe is applied to the pre-amplifier which has high gain and very low noise to signal ratio. The amplified signal consists of the flow induced component and an undesirable transformer induced component. The second stage of amplification incorporates a gating circuit which synchronizes the response of the amplifier with the peak amplifier of the flow induced pulse, as indicated in the block diagram. This gating frequency is supplied by the oscillator used to pulse the electromagnet. This technique discriminates against the transformer induced emf and allows only the flow induced component to reach the integrator and recorder read-out.

Fundamentally, the gated sine-wave circuit functions as a "switching" device synchronized with the pulsing of the electromagnetic field providing the following advantages: zero flow reference obtained without occluding the flow vessel, improved signal-to-noise ratio, polarization effects eliminated and inductive transients minimized . . . (From 4-page Bulletin F102, Medicon Div., Quality Precision Products, Inc., 3700 S. Broadway, Los Angeles, 7, Calif.)

FOR THIS LITERATURE CIRCLE 173 ON READER-SERVICE CARD

Digital Cardi tachometer

The Model 120 Cardi tachometer is the only unit of this type to offer true linear scale pulse rate presentation over a wide range in both numerical and proportional form. The full range of pulse rate variation in man and



most animals can be picked up from any of a variety of attachments and displayed or recorded.

Signals varying cyclically with heart action are picked up from the ear, finger, ECG, or blood pressure cuff. The time interval, t , between successive cycles is continuously measured. Since pulse rate,

$$P.R. = 1/t$$

the quantity $1/t$ must be calculated. A computer circuit built into the Model 120 instantaneously computes and displays this quantity . . . (From new data sheet, Gilford Instrument Labs., Inc., Oberlin, Ohio.)

FOR THIS LITERATURE CIRCLE 174 ON READER-SERVICE CARD

NEWS Continued

Kidney Function Evaluation

TOLEDO, OHIO.—A simple, mathematical method to aid in evaluating kidney function has won the 1961 Annual Kimble Medical Technology Award for Charles Ray Ratliff, M.S., M.T. (ASCP), technical and administrative supervisor of the Department of Pathology, Birmingham Baptist Hospital, and Howard C. Elliott, Ph.D., associate professor, University of Alabama Center. Their process provides for a single injection method using paraaminohippuric acid and relating its removal from the body in terms of first-order kinetics as an Excretion Constant, and easily performed procedures (requiring only one intravenous injection and several voided urine samples) that can be performed and evaluated in any laboratory with a colorimeter or spectrophotometer.

HOMOGENIZERS, 3 bulletins describe stainless steel, lab, and production units with capacities from 25 to 2,500 gal/hr.—C. W. Logeman Co., 633 Bergen St., Brooklyn 38, N. Y.

CIRCLE 175 ON READER-SERVICE CARD

LAB APPARATUS, 16-page catalog includes descriptions and prices of centrifuges, incubators, stills, gages, lab ware.—Gardner Laboratory, Inc., Box 5728, Bethesda 14, Md.

CIRCLE 176 ON READER-SERVICE CARD

REFRIGERATED MICROTOME, 12-page Handbook and 4-page Bulletin WC explain operation and applications of Microtome Cryostat.—International Equipment Co., 1284 Soldiers Field Rd., Boston 35, Mass.

CIRCLE 177 ON READER-SERVICE CARD

LAB INSTRUMENTS, 12-page supplement to Catalog 7 describes sonic Cell Fracturing Apparatus, color-coded serological pipettes, cryostat-microtome, mobile animal caging system, etc.—Will Corp., Box 1050, Rochester 3, N. Y.

CIRCLE 178 ON READER-SERVICE CARD

TISSUE CULTURE, 16-page Bulletin TC-4 details medical and tissue culture apparatus.—Kontes Glass Co., Vineland, N. J.

CIRCLE 179 ON READER-SERVICE CARD

SONIC OSCILLATORS, 8-page Data Sheet 7-410 describes low frequency magnetostriction units available for precise, rapid duplication of physico-chemical reactions in acceleration of bacteria growth, disintegration of bacteria, etc.—Raytheon Co., Commercial Apparatus & Systems Div., Boston-Providence Turnpike, Norwood, Mass.

CIRCLE 180 ON READER-SERVICE CARD

BEHAVIORAL RESPONSE MEASUREMENT, 5-page reprint, "Simple Transducers to Detect or Record Operant Amplitude," reports behavioral measurement experiments at Columbia University by means of pressure-sensitive paint and Micro-ducer pressure transducers.—Clark Electronic Labs., Box 165, Palm Springs, Calif.

CIRCLE 181 ON READER-SERVICE CARD

BEHAVIOR ANALYSIS, New catalog describes test chambers, recorders, EEG and stimulation components, and kits for behavioral studies.—Lehigh Valley Electronics, 215 S. 3 St., Allentown, Pa.

CIRCLE 182 ON READER-SERVICE CARD

BIOLOGICAL COMPUTER, Bulletin C-1 gives operational and application information on "first portable, biological digital Computer" for simultaneous, on-line calculations of average evoked responses of several variables.—Mnemotron Corp., 47 S. Main St., Pearl River, N. Y.

CIRCLE 183 ON READER-SERVICE CARD

BIOLOGICAL TELEMETRY, Product Sheet 99 and Product Sheet 70-1 describe Biotel Vest, Receiving Console, and Biotel Transmitter and Power Supply.—Spacelabs, Inc., 14819 Aetna St., Van Nuys (Los Angeles Co.), Calif.

CIRCLE 184 ON READER-SERVICE CARD

PHYSIO-TACHOMETER, 4-page bulletin describes instrument that provides instant, visual readout of human or animal impulse rate for any type of physiological activity.—Electronic Aids, Inc., 2615 Windsor Ave., Baltimore 16, Md.

CIRCLE 185 ON READER-SERVICE CARD

NUCLEAR MEDICINE, 4-page Bulletin SP8106 presents Scintillation Uptake System, Dual Channel Analyzer, Scaler-Ratemeter, collimating attachments.—Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.

CIRCLE 186 ON READER-SERVICE CARD

NUCLEAR MEDICINE, Series of bulletins describes radio-isotope apparatus for thyroid, renal function, and cardiac diagnosis; Cerebral Radio-rheograph for cerebral blood flow analysis. AtoMation Inc., Div. C. W. Reed Co., Inc., 5959 S. Hoover St., Los Angeles 44, Calif.

CIRCLE 187 ON READER-SERVICE CARD

DEEP THERAPY APPARATUS is described in 4-page brochure.—Standard X-Ray Co., 1932 Burling St., Chicago 14, Ill.

CIRCLE 188 ON READER-SERVICE CARD

NUCLEAR REACTOR, 8-page report presents medical uses of TRIGA Reactor for training, research, and isotope production.—Medical Reactor Group, General Atomic Div., General Dynamics Corp., Box 608, San Diego 12, Calif.

CIRCLE 189 ON READER-SERVICE CARD

RADIATION SURVEYS, 8-page booklet describes types of hazards and "Bio-Assays for Hazard Control"; 10-page report describes "Environmental Radioactivity Surveys."—Controls for Radiation, Inc., 130 Alewife Brook Parkway, Cambridge 40, Mass.

CIRCLE 190 ON READER-SERVICE CARD

MEDICAL ELECTRONICS NEWS

RADIATION PROTECTION, 4-page Bulletin 407 presents accountability and health physics services.—Nuclear Science and Engineering Corp., Box 10901, Pittsburgh 36, Pa.

CIRCLE 191 ON READER-SERVICE CARD

RADIATION MEASUREMENT, 12-page catalog describes dosimeters, chargers, readers, etc.; includes price list.—Landsverk Elcetrometer Co., 641 Sonora Ave., Glendale 1, Calif.

CIRCLE 192 ON READER-SERVICE CARD

NUCLEAR INSTRUMENTS, 14-bulletin Product Reference Manual details scalars, ratemeters, well counters, scanners, etc.—Curtis Nuclear Corp., 1645 W. 135 St., Gardena, Calif.

CIRCLE 193 ON READER-SERVICE CARD

NUCLEAR INSTRUMENTS, 64-page General Catalog F describes counting systems, scalars, spectrometers, timers, detectors, radioactive sources, etc.—Tracerlab, 1601 Trapelo Rd., Waltham 54, Mass.

CIRCLE 194 ON READER-SERVICE CARD

NUCLEAR INSTRUMENTS, Labeled compounds, and health physics/chemistry services are described in folder of catalog sheets.—Hazleton Nuclear Science Corp., 4062 Fabian Way, Palo Alto, Calif.

CIRCLE 195 ON READER-SERVICE CARD

PULSE HEIGHT ANALYZER, Model 2970, is described in 4-page Bulletin N-1859.—Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

CIRCLE 196 ON READER-SERVICE CARD

NUCLEAR INSTRUMENTS, 32-page Catalog C details accessories—chromatogram scanners, survey meters, dosimeters, training aids, kits, etc.—Atomic Accessories Inc., 813 W. Merrick Rd., Valley Stream, L. I., N. Y.

CIRCLE 197 ON READER-SERVICE CARD

NUCLEAR MEASUREMENT, 50-page Catalog A-5 details scintillation and scaler systems, and individual measuring instruments—scalars, amplifiers, ratemeters, detectors, etc.—Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.

CIRCLE 198 ON READER-SERVICE CARD

NUCLEAR SAMPLE TRANSFER, Data sheet describes Flexo-Rabbit Pneumatic Transfer System for transporting samples to and from nuclear sources.—Radiation Equipment and Accessories Corp., 665 Merrick Rd., Lynbrook, N. Y.

CIRCLE 199 ON READER-SERVICE CARD

NUCLEAR INSTRUMENTS, 8-page Bulletin GEA-7259 describes range of nuclear electronic products and services available, including counters and compensated ion chambers.—General Electric Co., Schenectady 5, N. Y.

CIRCLE 200 ON READER-SERVICE CARD

DOSIMETER READER, 2-page Bulletin RDR describes accessory equipment by which any standard Turner Fluorometer is converted into dosimeter reader.—G. K. Turner Assoc., 2524 Pulgas Ave., Palo Alto, Calif.

CIRCLE 201 ON READER-SERVICE CARD

RADIATION MONITORS, 5 bulletins describe Hand and Foot Monitor; portable neutron, alpha, geiger and gamma counters.—Eberline Instrument Corp., Box 279, Santa Fe, N. M.

CIRCLE 202 ON READER-SERVICE CARD

RADIOACTIVITY MEASURING, 6-page brochure describes Tri-Carb® Liquid Scintillation Spectrometers, Flow Monitor, Small Animal Counter, and chromatography instruments.—Packard Instrument Co., Inc., Box 428, La Grange, Ill.

CIRCLE 203 ON READER-SERVICE CARD

RADIOACTIVITY MEASURING, 96-page Catalog S describes more than 250 instruments, counting systems, radio-nuclides, and nuclear accessories.—Nuclear-Chicago Corp., 359 E. Howard Ave. at Nuclear Dr., Des Plaines, Ill.

CIRCLE 204 ON READER-SERVICE CARD

BALANCES, 28-page Catalog AW-13 describes lab balances and weights, includes NBS tolerances, table of conversion factors.—Wm. Ainsworth & Sons, Inc., 2151 Lawrence St., Denver, Colo.

CIRCLE 205 ON READER-SERVICE CARD

BIOCHEMISTRY APPARATUS, Binder-type catalog (more than 100 pages) includes color-coded sections describing micro and ultramicro glassware, balances, apparatus.—Microchemical Specialties Co., 1825 Eastshore Hwy., Berkeley 10, Calif.

CIRCLE 206 ON READER-SERVICE CARD

BACTERIA, CELL CULTURE, 22-page bulletin discusses technique for experimentation in CO₂ incubation, and apparatus.—National Appliance Co., 7634 S. W. Capitol Hwy., Portland 19, Ore.

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1	16	31	46	61	76	91	106	121	136	151	166	181	196	211	226	241	256	271
2	17	32	47	62	77	92	107	122	137	152	167	182	197	212	227	242	257	272
3	18	33	48	63	78	93	108	123	138	153	168	183	198	213	228	243	258	273
4	19	34	49	64	79	94	109	124	139	154	169	184	199	214	229	244	259	274
5	20	35	50	65	80	95	110	125	140	155	170	185	200	215	230	245	260	275
6	21	36	51	66	81	96	111	126	141	156	171	186	201	216	231	246	261	276
7	22	37	52	67	82	97	112	127	142	157	172	187	202	217	232	247	262	277
8	23	38	53	68	83	98	113	128	143	158	173	188	203	218	233	248	263	278
9	24	39	54	69	84	99	114	129	144	159	174	189	204	219	234	249	264	279
10	25	40	55	70	85	100	115	130	145	160	175	190	205	220	235	250	265	280
11	26	41	56	71	86	101	116	131	146	161	176	191	206	221	236	251	266	
12	27	42	57	72	87	102	117	132	147	162	177	192	207	222	237	252	267	
13	28	43	58	73	88	103	118	133	148	163	178	193	208	223	238	253	268	
14	29	44	59	74	89	104	119	134	149	164	179	194	209	224	239	254	269	
15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	

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3	18	33	48	63	78	93	108	123	138	153	168	183	198	213	228	243	258	273
4	19	34	49	64	79	94	109	124	139	154	169	184	199	214	229	244	259	274
5	20	35	50	65	80	95	110	125	140	155	170	185	200	215	230	245	260	275
6	21	36	51	66	81	96	111	126	141	156	171	186	201	216	231	246	261	276
7	22	37	52	67	82	97	112	127	142	157	172	187	202	217	232	247	262	277
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9	24	39	54	69	84	99	114	129	144	159	174	189	204	219	234	249	264	279
10	25	40	55	70	85	100	115	130	145	160	175	190	205	220	235	250	265	280
11	26	41	56	71	86	101	116	131	146	161	176	191	206	221	236	251	266	
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14	29	44	59	74	89	104	119	134	149	164	179	194	209	224	239	254	269	
15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	

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845 Ridge Avenue

Pittsburgh 12, Penna.

9/61

TEST TUBE RACK. 4-page Bulletin TT-101 details advantages of new rack that handles up to 54 tubes in six 9-tube drawers.—Advance Scientific Corp., 1359 Frankford Ave., Phila. 25, Pa.

CIRCLE 208 ON READER-SERVICE CARD

POWER SUPPLIES. 2 Product Bulletins, M-8 and M-10, describe Model M-T 20 Medical AC 0-to-6 Vari-Powerlite and Model PS 129 24-v DC Power Supply.—Med-Tronics Mfg. Co., Inc., 2019 Westchester Ave., Bronx 62, N. Y.

CIRCLE 209 ON READER-SERVICE CARD

TEACHING DEVICE. 4-page bulletin presents plastic units, printed circuits, drawings to teach use and construction of electronic systems.—Electronic Aids, Inc., 857 N. Eutaw St., Baltimore 1, Md.

CIRCLE 210 ON READER-SERVICE CARD

TIMER. Data sheet describes Model L Electronic Interval Timer for controlling filling equipment, testing, process control, etc.—C. W. Logeman Co., 633 Bergen St., Brooklyn 38, N. Y.

CIRCLE 211 ON READER-SERVICE CARD

CLOSED CIRCUIT TV MICROSCOPE is detailed in 4-page bulletin.—Elgeet Optical Co., Inc., 838 Smith St., Rochester 6, N. Y.

CIRCLE 212 ON READER-SERVICE CARD

INFORMATION STORAGE and Retrieval System, GE225, is explained in 8-page Bulletin CPB-153.—General Electric, Computer Dept., Phoenix, Ariz.

CIRCLE 213 ON READER-SERVICE CARD

DISPOSABLE SYRINGES from 1 to 50 cc, color coded and pre-sterilized, are described in 4-page bulletin.—Disposable Hospital Products, Inc., Subs. Fairbanks, Morse & Co., 122 E. Grand Ave., San Francisco, Calif.

CIRCLE 214 ON READER-SERVICE CARD

LIQUID NITROGEN. 8-page Bulletin F-1270 describes uses and advantages of preserving biological materials with liquid nitrogen.—Linde Co., Div. Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

CIRCLE 215 ON READER-SERVICE CARD

AURAL ANALGESIA. Data sheet describes white sound generator for dental use.—Taper Micrometer Corp., 100 Grove St., Worcester, Mass.

CIRCLE 216 ON READER-SERVICE CARD

GAS DETECTOR. 4-page bulletin describes Model 60 that detects toxic vapors.—Brothers Chemical Co., 575 Forest St., Orange, N. J.

CIRCLE 217 ON READER-SERVICE CARD

LINT-FREE GLOVES, uniforms and accessories are described in 8-page catalog.—Angelica Uniform Co., 107 W. 48 St., New York 36, N. Y.

CIRCLE 218 ON READER-SERVICE CARD

OSCILLOSCOPE ACCESSORIES. 16-page catalog describes carts, probes, viewing hoods, etc.—Textronix, Inc., Box 500, Beaverton, Ore.

CIRCLE 219 ON READER-SERVICE CARD

IRRADIATION. 8-page brochure surveys uses of radiation in research and industry; 20-page catalog describes system components.—Radiation Dynamics, Inc., Westbury Industrial Park, Westbury, L. I., N. Y.

CIRCLE 220 ON READER-SERVICE CARD

MICROSCOPES. Brochures detail operation and applications of Zeiss standard, lab, plankton, stereo, fluorescence, and photo-microscopes.—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, L. I., N. Y.

CIRCLE 221 ON READER-SERVICE CARD

MICRO MANIPULATORS. 8-page brochure describes precision instruments for 3-dimensional positioning of micro tools and other objects under low power and regular compound microscopes.—Brinkmann Instruments, Inc., 115 Cutter Mill Rd., Great Neck, L. I., N. Y.

CIRCLE 222 ON READER-SERVICE CARD

SOUND MEASUREMENT. 16-page booklet presents sound-level meters, analyzers, vibration measuring equipment, etc.—General Radio Co., West Concord, Mass.

CIRCLE 223 ON READER-SERVICE CARD

CAMERA SOUND ACCESSORY. 12-page brochure and 4-page reprint feature compact Nomad magnetic recorder which interlocks to 16 mm camera to permit sound recording synchronized with film.—Magnasyn Corp., 5546 Satsuma Ave., North Hollywood, Calif.

CIRCLE 224 ON READER-SERVICE CARD

Electromagnetic Probe Company

3800 Cash Drive
Winston-Salem, N. C.

Manufacturers of
High Sensitivity

BLOOD FLOW TRANSDUCERS

Non-Cannulating
& Extracorporeal Units

Come by to see us at
Booth 11

American Heart Meeting
Miami, Oct. 20-22

CIRCLE 27 ON READER-SERVICE CARD

ORGANIC MICROANALYSIS

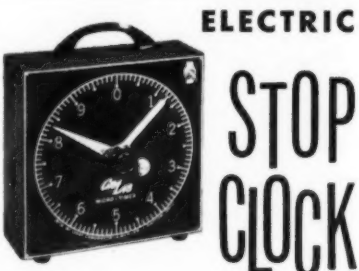
H. W. Galbraith, Ph.D.

P.O. Box 4187 Knoxville 21, Tenn.
Founded 1950

CIRCLE 28 ON READER-SERVICE CARD

Medical Electronic Sales Manager or Consultant—Rare opportunity for the right man in New York City. Write about your background and Experience to: President—The Interstate Manufacturing Corporation, 190 Boston Post Road, Orange, Connecticut

CIRCLE 29 ON READER-SERVICE CARD



GRALAB MICRO TIMERS—1/10 sec. or 1/1000 min. steps for split-second accuracy in lab or production work. Giant 8" dial, white on black. Remote start-stop control. Write for catalog.

DIMCO-GRAY COMPANY
213 E. SIXTH ST., DAYTON 2, OHIO
CIRCLE 30 ON READER-SERVICE CARD

Fetal EKG Preamplifier
\$125

Impedance Plethysmographs
\$75 & \$150

Digital Plethysmograph
\$125

The output plug on these instruments fits the patient cable receptacle of most electrocardiographs and cardiographs.

Parks Electronics Lab.
Rt. 2 Beaverton, Oregon

CIRCLE 231 ON READER-SERVICE CARD

LABORATORY APPARATUS. 72-page Catalog 60G presents electro-analysis apparatus, stirrers, shakers, tables, cabinets, etc.—Eberbach Corp., Box 1024, Ann Arbor, Mich.

CIRCLE 225 ON READER-SERVICE CARD

GLASS AND GLASS-CERAMICS. 68-page illustrated booklet reviews history of glass, details basic types, describes expanding role of glass in science, industry, electronics, etc.—Corning Glass Works, Corning, N. Y.

CIRCLE 226 ON READER-SERVICE CARD

LABWARE CLEANING. 2-page flyer describes and explains uses of Chromerge additive for preparation of chromic-sulphuric acid cleansing solution; also Aqueat lab detergent.—Emil Greiner Co., 20-26 N. Moore St., New York 13, N. Y.

CIRCLE 227 ON READER-SERVICE CARD

Medical Applications of Scintillation Counter



Monitoring of radiation in hospitals is necessary to determine that radioactive sources are used and stored properly . . . By a simple substitution method the calibration of gamma ray sources can be accomplished. The survey meter is first placed in the test geometry at a known distance from the unknown source. The meter reading from the unknown is compared with the

reading obtained from a known source of the same type and construction at the same position after the unknown is removed from the vicinity . . . Special probes can be supplied for the survey and determination of localized activity within the human body of radioisotopes used in medical treatment . . . Model 15-2 will determine that X-ray devices are properly operated, ports and doors are closed when required, and safety regulations are observed . . . Dilution requirements for disposal of activity can also be checked by monitoring sewage lines . . . Model 15-2 ultrasensitive meter has a response sensitivity 1,000 times greater than a conventional Geiger counter survey instrument. In the normal laboratory background of less than 0.01 mr/hr, a source of one millicurie of Cobalt 60 can be detected in 2 seconds up to 60 feet away. With a 20-second time constant, the range is 200 feet . . . (From 32-page booklet, "Applications Engineering," Franklin Systems, Inc., 2734 Hillsboro Rd., West Palm Beach, Fla.)

FOR THIS LITERATURE CIRCLE 232 ON READER-SERVICE CARD

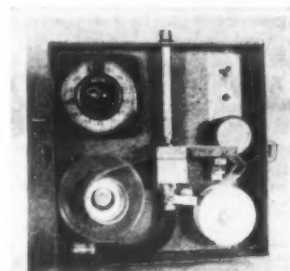
Measuring Percent Oxygen Saturation in Blood

The percentage oxygen saturation in blood is a bio-constant which indicates the most important cardio-respiratory functions and which is maintained at a fairly constant value to within a few percent in the healthy organism. The Hemoreflexor measures percentage oxygen saturation in blood under clinical condition e.g. during cardiac catheterizations. The instrument is simple, requires no particular skill, and requires small (0.5 ml) blood samples, obtained by puncture or catheterization. A measurement can be taken within 3 minutes with an accuracy of 1%.

Measurement, based on the intensity of light reflected by a blood layer, is carried out with light of 600-700 mμ, which is strongly absorbed by hemoglobin but which is absorbed to a much lesser extent by oxyhemoglobin. The quantity of light reflected by a blood sample is a function of the oxygen saturation. With the blood sample in the Hemoreflexor and turned into the light path, the built-in light spot galvanometer shows a deflection, which indicates the oxygen saturation. The blood need not be hemolyzed; nor is it necessary to determine the total concentration of hemoglobin . . . (From 4-page bulletin, James G. Biddle Co., 1316 Arch St., Phila. 7, Pa.)

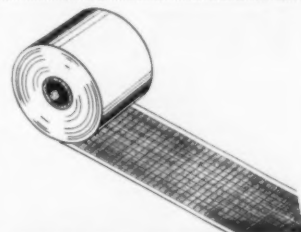
FOR THIS LITERATURE CIRCLE 233 ON READER-SERVICE CARD

Automatic Sampling on Continuous Tape



The automatic Paper Tape Air Sampler has been widely adopted as a means of sampling dust in air and to provide a continuous record of ambient dust concentration. This device filters air through a round spot on 1" wide paper tape or membrane filter. After a pre-set filtering period the paper tape automatically advances to a clean spot and sampling begins again. Upon completing a series of samples, the paper tape may be removed and evaluated for dust content by a variety of methods: photoelectric; chemical analysis, activation analysis, microscopic examination, beta gauging nuclear techniques . . . Some other measurement techniques which may be used to determine aerosols collected on paper tapes are: X-ray diffraction and fluorescence, biological and microbiological measurements, infrared and ultraviolet spectroscopy, electrical conductivity . . . (From 24-page "Dust Topics," June 1961, Gelman Instrument Co., 106 N. Main St., Chelsea, Mich.)

FOR THIS LITERATURE CIRCLE 234 ON READER-SERVICE CARD



SCHUCOGRAPHIC RECORDING CHART PAPER

For All Types Of EKG, EEG And Metabolism Machines

SCHUCOGRAPHIC CHARTS ARE:

- Precision Wound
- Tear Proof
- Stylus Heat Resistant
- Super-Sensitive
- Unconditionally Guaranteed

Write For Complete Catalog Listing

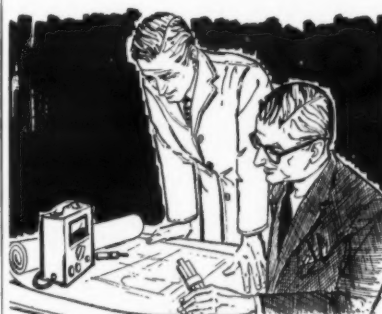
SCHUCO SCIENTIFIC

A DIVISION OF
SCHUELER & COMPANY
75 Cliff Street, New York 38, N. Y.

CIRCLE 31 ON READER-SERVICE CARD

the most complete line of CONDUCTIVITY EQUIPMENT

Industrial Instruments Inc., since its inception more than 20 years ago, has devoted itself to the design and manufacture of electrolytic conductivity bridges and conductivity cells. Industrial Instruments catalog No. 23 presents the most complete line of conductivity equipment in the world. A copy is available on request.



In addition to its extensive line of cataloged industrial and laboratory bridges and cells, Industrial Instruments is pleased to work with researchers in the design and construction of special test equipment in this and related fields.

Typical conductivity bridges and cells are illustrated below. Contact us if you have an application for standard or special electrolytic conductivity apparatus.



CIRCLE 32 ON READER-SERVICE CARD

MEASURE MOLECULAR WEIGHT AND PARTICLE SIZE



NEW BRICE-PHOENIX UNIVERSAL LIGHT SCATTERING PHOTOMETER

Measures:

1. Absolute Turbidity
2. Dissymmetry
3. Depolarization

This instrument is listed in U.S. Government specifications for the evaluation of certain clinical materials. For complete details write Dept. CE-2

PHOENIX PRECISION INSTRUMENT COMPANY
3805 N. 5th St. Philadelphia 40, Pa.

CIRCLE 135 ON READER-SERVICE CARD

SAVE 20% ON CARDIOGRAPH PAPER!

Cost conscious? Now save 20% or more on precision quality cardiograph chart paper direct from manufacturer's hospital-tested for two years... Techni-Rite J-B is a smooth, waterproof paper yielding crisp black tracings... for your Sanborn, Birtcher or G.E. heated-stylus equipment. Prove it yourself: try it now on a money-back guarantee!

20% savings on cardiograph writing arms and styli. (See Check box for full details and prices.)

CHART NUMBERS	TECHNI-RITE J-B Equivalent	Price per roll
Sanborn 651-40	G.E. F4009	HS 11 BG
Birtcher 350		\$2.75 (2-6 rolls)

techni-rite
JUDSON-BIGELOW SALES DIVISION

Use Coupon For MONEY-BACK GUARANTEE!

TO: Techni-Rite Electronics, Inc., 59 Centerville Road, Warwick, R. I.

Please send _____ rolls Techni-Rite J-B Cardiograph Paper. My money immediately refunded if I am not completely satisfied.

Name _____

Address _____

City _____

Zone _____

State _____

☐ Please include full info and prices on your cardiograph styli.

CIRCLE 136 ON READER-SERVICE CARD

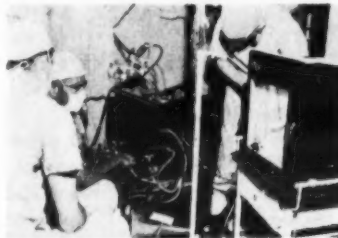
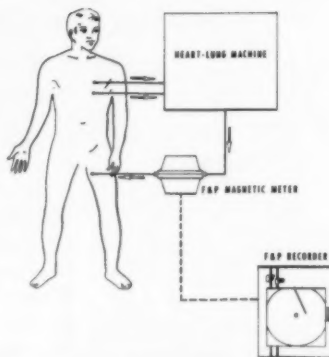
Surgical Master Monitor

At Our Lady of Fatima Hospital (Providence, R. I.), Epsco's Surgical Master Monitor . . . immediately displays and permanently records a broad spectrum of data on patient condition from induction of anesthesia, throughout surgery, to recovery. By locating all data processing instrumentation at a central station it reduces the equipment required for monitoring many patients, and eliminates clutter and explosion hazards in the operating theater . . . Its electronically-precise information gives new speed and effectiveness in meeting emergencies. Its availability can supply the final go-ahead in a wide variety of poor-risk cases. Its continuous records provide the hospital with an ever-growing body of comprehensive data for procedural analyses, and a teaching aid as well. Furthermore, it greatly simplifies patient history folders by recording data from each operation on a single chart.

The system's design utilizes modular construction, guaranteeing it against obsolescence and permitting easy expansion for increased demands . . . The basic modalities which indicate the condition of a patient during surgery and recovery—EEG, ECG, arterial pressure, systolic pressure, diastolic pressure, venous pressure, esophageal and rectal temperatures, pump pressure, blood temperature, and blood flow—are all provided in reproducible format by the Monitor. (From 6-page brochure, Epsco Medical, Div. Epsco, Inc., 275 Massachusetts Ave., Cambridge 39, Mass.)

FOR THIS LITERATURE CIRCLE 236 ON READER-SERVICE CARD

BLOOD FLOWMETERING



New application of industrial-type flowmetering equipment helps create near-normal circulation rate of blood returning (from heart-lung machine) to patient under critical open heart surgery. Surgeons use data from magnetic-type flowmeter and a-c potentiometer recorder. This flowmeter type uses obstructionless tube, does not churn blood or damage cells. Recorder has five flow ranges to suit various circulation rates. Original equipment, made available through John A. Hartford Foundation grant, has been used successfully in over 100 operations. Laboratory studies have indicated that flowmetering has negligible over-all effect on blood, and no effect on critical variables such as pH, cell content, and cell composition.—Fischer & Porter Co., 939 Jacksonville Rd., Warminster, Pa.

CIRCLE 237 ON READER-SERVICE CARD

X-RAY FILM PROCESSOR



New Minirol-X, X-Ray Film Processor and Dryer, for office, hospital and clinical use occupies less than 10 sq ft of space, is of hangerless operation with worm driven racks and horizontal dryer. Processing time is only 7 minutes; unit handles 110 mixed size films/hr.—Pako Corp., 6300 Olson Memorial Hwy., Minneapolis 40, Minn.

CIRCLE 238 ON READER-SERVICE CARD

FACIAL STIMULATOR

New physiological stimulator for use during surgery in the facial area, especially during removal of tumor masses, weighs 1 lb (vs. conventional 30-lb unit), is battery-operated to reduce explosion hazard. Unit may be used to test nerve function during surgical procedures in body areas other than the face.—Theratron Corp., 263 Griggs-Midway Bldg., St. Paul 4, Minn.

CIRCLE 239 ON READER-SERVICE CARD

X-RAY FILM

New single-coated, extra-fine grain, high-contrast Industrial Type M X-ray Film provides improved radiographic sensitivity by reducing parallax to a minimum. Such film is required for critical industrial radiographic examinations involving magnified film viewing or projection printing of radiographs. Film has regular Type M emulsion coated on only one side of base and soluble black gelatin coating on other. Exposure speed is half that of double-coated Type M Film.—X-ray Sales Div., Eastman Kodak Co., Rochester 4, N. Y.

CIRCLE 240 ON READER-SERVICE CARD

BLOOD PRESSURE RECORDER

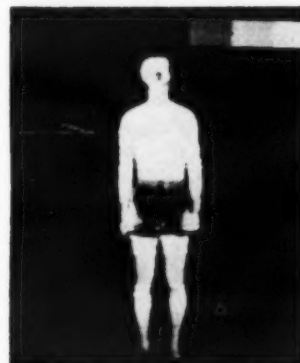


New automatic blood pressure measuring system records both systolic and diastolic blood pressure, transforms measurements into electrical signal. Applications include use in post surgical recovery rooms and automatic reports on patients with illness requiring periodic blood pressure recording. Warning device can be included to summon aid when system detects blood pressure levels above or below preset limits.

System consists of sensing device in occluding cuff, and electronic transducer. To operate, sensor is placed over convenient artery, preferably the brachial in the arm. Cuff is inflated and gradually deflated, as in present method. During deflation, sensor picks up all cardiovascular sounds and feeds signals to electronic transducer which selectively filters out all sounds not truly cardiovascular in origin and much of cardiovascular sound that does not contribute to clear identification of systolic and diastolic levels. Final measurement can then be amplified and recorded on tape or telemetered to a receiver.—AirResearch Mfg. Div. of Los Angeles, Garrett Corp., 9851 Sepulveda Blvd., Los Angeles 45, Calif.

CIRCLE 241 ON READER-SERVICE CARD

IR CAMERA MEASURES TEMP



In Air Force experiments, newly developed Infrared Camera furnishes valuable physiological information and data on rates of heat loss from different parts of the body, aids in gathering data for designing suitable clothing for arctic living. Special camera photographs subject using only infrared radiation constantly radiated by his body. Temperature of any area is obtained from its shade of gray in the print—darker shades indicate colder areas. Camera consists of radiometer and automatic scanning system with photo-recording mechanism.—Barnes Engr. Co., 40 Commerce Rd., Stamford, Conn.

CIRCLE 242 ON READER-SERVICE CARD

QRS MONITOR

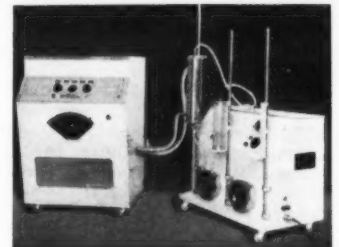


New electronic QRS Monitor measures and records patient's heart activity while he is active and also at rest. Portability allows doctor and patient freedom of movement for diagnosis under stress conditions. Unit detects electrical activity through surface electrodes. Three-position gain control provides amplification in excess of 1½ million. Optional circuit actuates alarm when heart beat varies beyond preset meter setting (0 to 200). Accuracy is $\pm 1\%$ from 15 to 200 beats/min.—Electronic Medical Systems, Inc., 1449 University Ave., St. Paul 4, Minn.

CIRCLE 243 ON READER-SERVICE CARD

ELECTRONIC HEART-LUNG MACHINE

New Heart-Lung Machine is "first to be electronically controlled," and to provide necessary refrigeration for such advanced heart surgery techniques as profound hypothermia. System consists of two mobile units: double blood pump system (right) for extracorporeal blood circulation that includes mountings for blood reservoirs, heat exchangers, blood filter, oxygenator and drive mechanism and coronary suction device; and self-contained heating and refrigeration system with necessary storage tanks for all forms



of hypothermia. Available are heat exchanger units in three sizes, reservoir units of various capacities, blood line and patient temperature probes, atrial and arterial cannulae and necessary connectors, chest cavity suckers and other accessories used in open heart surgery. Artificial oxygenation can be provided to permit combined extracorporeal circulation and hypothermia techniques.—Minneapolis-Honeywell Regulator Co., Heiland Div., 5200 E. Evans Ave., Denver 22, Colo.

CIRCLE 244 ON READER-SERVICE CARD

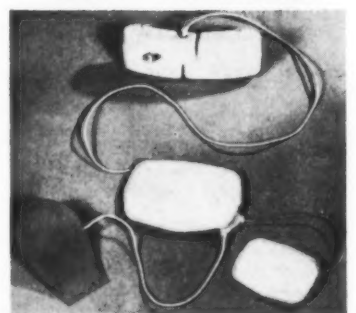
ECG INSTRUMENTS



Three new instruments are available for use in practical continuous ambulant electrocardiography. New Electrocardiograph® records in portable self-powered unit every electrocardiogram from an active subject over continuous 10-hr period. New Avsep® Analyzer permits rapid examination of voluminous data from Electrocardiograph by presenting what appears to be a single electrocardiographic pattern visibly changing its form as electrocardiographic changes actually occur. Also, new Arrhythmograph® compresses continuous pulse data to yield quantitative information on rate irregularities occurring during the day regardless of patient's location or activity. Serious heart rate disorders otherwise undetected by patient or physician can then be identified for treatment.—Holter Research Foundation, Inc., Helena, Montana.

CIRCLE 245 ON READER-SERVICE CARD

MUSCLE STIMULATOR

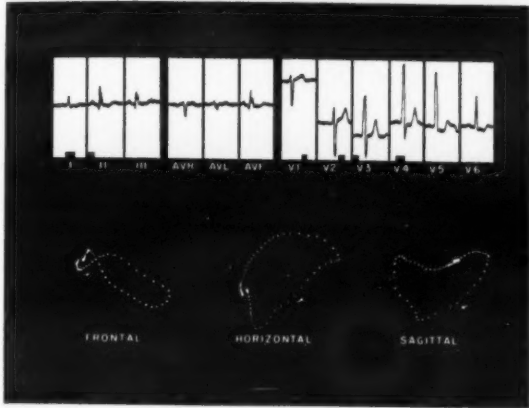


New Theratron Muscle, portable electronic muscle stimulator designed to overcome the problems of drop foot, replaces lower leg brace on hemiplegic patients, successfully eliminates drag-and-shuffle gait. Theratron electrode applies muscle-activating pulse to skin surface over motor point of selected dorsiflexor. Second reference electrode is applied to gastrocnemius portion of the leg to complete circuit. Switch placed beneath patient's heel inside shoe, automatically interrupts muscle-activating pulse, applies stimulation, causing flexion of foot.—Theratron Corp., 263 Griggs-Midway Bldg., St. Paul 4, Minn.

CIRCLE 246 ON READER-SERVICE CARD

Vectorcardiography and Spatial Heart Fields

One of the leaders in the new vectorcardiographic approach to the study of the heart was Harvey Estes, M.D. Dr. Estes at first refrained from complex instrumentation and used the scalar ECG to develop his ideas. He also co-authored a book on vectorcardiography.



Above are the vectorcardiograph loops describing the three planes of the electrical field of the heart, designated frontal, horizontal, and sagittal (side). The routine scalar electrocardiographic leads from the same patient are displayed at the top.



Researcher in the process of photographing vectorcardiograph loops from the face of a cathode ray oscilloscope.

Two theoretically sound lead systems have prompted Dr. Estes to add instrumentation to his laboratories at the Veterans Administration Hospital in Durham, North Carolina, where he is evaluating the systems' validity. He also developed an interesting technique for photographing vectorcardiograph tracings.

The vectorcardiograph is displayed as an x-y of two potentials. A photograph of an oscilloscope display of the vector loop will usually be over-exposed at one of the most critical points because of the changing velocity-of-motion of the oscillograph beam. Using the inherent time-base reduction capability of his Ampex FR-100 recorder, Dr. Estes reproduces the loops in slow motion so that the photographer can "ride" the intensity control of the oscilloscope and eliminate overexposure. The results are more detailed vector loops and more exact diagnosis. The "slow motion" technique also eliminates the need of a gating circuit.

At the present time, Dr. Estes and his associates are collecting vector loops from many patients at the hospital—with and without known abnormalities—to establish more accurate parameters for vectorcardiographic diagnosis. . . . (From 36-page Readout (April-May 1961), Ampex Data Products Co., Box 5000, Redwood City, Calif.)

FOR THIS LITERATURE CIRCLE 247 ON READER-SERVICE CARD

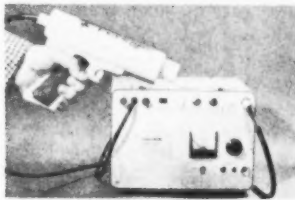
Electro-humidity Transducer

The PCRC Electro-humidity Transducer is an electric hygrometric circuit element which senses changes in relative humidity by changes in ohmic resistance. The transducer is a processed plastic wafer—a chemically treated styrene copolymer—which has an electrically conducting surface layer that is integral with the non-conducting substrate. Changes in relative humidity cause the surface resistivity to vary. . . . Since the humidity-sensitive portion of the sensor is restricted to the surface, water vapor is sorbed or desorbed by means of ADSorption instead of ABSorption; this results in a very rapid speed of response to changes in relative humidity. . . . The sensor is unaffected by environmental conditions that are not detrimental to polystyrene: this includes most gases, and those liquids that are non-ionic. . . . Electrical contact to the sensor surface is made by printed electrodes on both faces; convenient clip terminals are supplied for effecting circuit connections. . . . (From 4-page bulletin, Phys-Chemical Research Corp., 40 E. 12 St., New York 3, N. Y.)

FOR THIS LITERATURE CIRCLE 248 ON READER-SERVICE CARD

Portable Flash X-Ray System

The Fexitron Model 210 . . . provides radiographs of small to medium sized objects with an exposure time of 0.03 microsecond at 100 kv. The system includes a power



supply and a hand-held tube which are connected by a 70-ohm cable of any reasonable length. The tube head includes sufficient lead shielding to remove the radiation hazard; the head is 2" OD x 9" length and weighs approximately 2 lb. Its small size and portability enhance flexible illumination. Of course, the very short exposure time precludes blur due to operator motion and hence permits a hand-held tube, thereby avoiding the necessity of conventional mounting structures. . . . A film density of 0.7 is provided through approximately 1" of aluminum or 4" of water at 1'; shadowgraphs in air are obtained at distances up to 3'. Offner Div. of Beckman Insts. . . . (From 14-page report and 2-page data sheet, Field Emission Corp., McMinnville, Ore.)

FOR THIS LITERATURE CIRCLE 249 ON READER-SERVICE CARD

Catheter Cuvette Oximeter

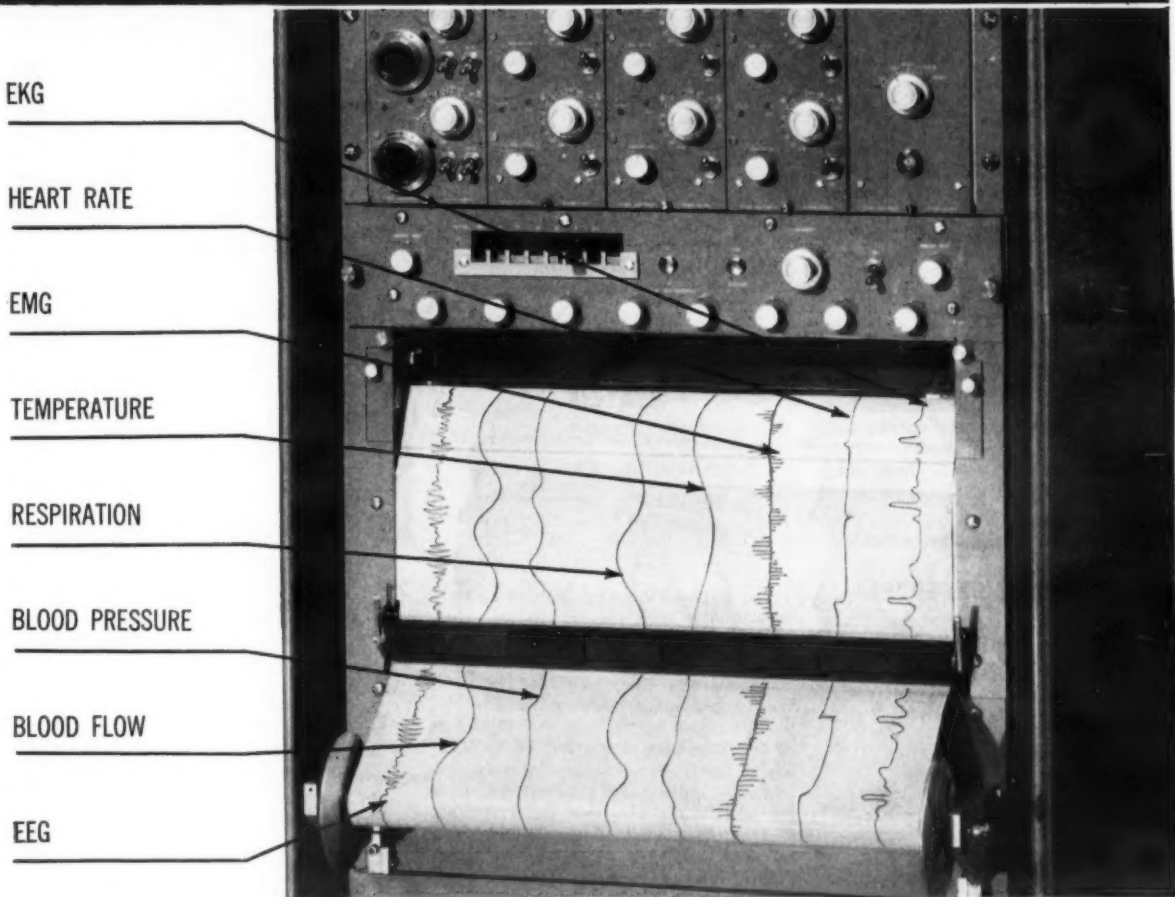
The Kipp CC-Oximeter is a new application of reflection oximetry. During heart catheterization it gives the oxygen saturation at the catheter tip, with a time lag of approximately 15-20 seconds. Reproducibility is better than $\pm 1\%$. The determination is carried out with a "measuring-eye" containing a light source with a color filter and selenium photo-cell. The measuring-eye is placed on a cuvette which can



easily be connected to the usual catheterizing equipment (Luer lock). A magnetic stirrer keeps the blood in the cuvette in rapid circular motion. The instrument also enables watching of oxygen saturation continuously when used with a special continuous flow cuvette now being developed. . . . (From 4-page Bulletin CC58, James G. Biddle Co., 1316 Arch St., Phila. 7, Pa.)

FOR THIS LITERATURE CIRCLE 250 ON READER-SERVICE CARD

for the Research Laboratory . . . for the Operating Room!



the OFFNER Type R Dynograph

All variables continuously displayed, immediately visible on low-cost ink recordings, or rectangular heat recording.

The Dynograph is the *only* oscillograph allowing the recording of all physiological variables with a single set of amplifiers. Any channel may be used for any application—only the low-cost input coupler is changed. Rectangular heat-sensitive or curvilinear ink writing interchangeable on the *same assembly*. With ink recording, the record may be observed continuously

during an experiment or an operation—providing a *permanent* record of the complete history at a negligible cost.

The large, clear record is easily visible from a distance, and is more easily and accurately interpreted than the fleeting image of the CRO. It may, however, be combined with simultaneous CRO display.

Sensitivities to one microvolt d-c or a-c, frequencies to over 200 cps, all types of transducers recorded.

Write for complete details.

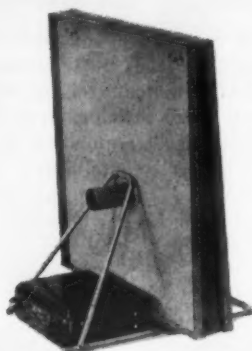


The Offner Type R is available in a variety of mountings to suit the application. Illuminated BMR rack illustrated above.

Beckman

OFFNER DIVISION
of Beckman Instruments, Inc.

3956 River Road, Schiller Park, Ill. (suburb of Chicago)
CIRCLE 251 ON READER-SERVICE CARD



WEDGE SPIROMETER 170

A simple and economical, high dynamics spirometer which provides simultaneous electrical output signals for volumes and flows. These signals are sufficiently large to drive standard recorders. The instrument is waterless but airtight. In spite of being driven by the patient's lungs the instrument offers virtually zero resistance to breathing. It satisfies all the needs of the researcher as well as the clinician. All standard pulmonary function tests can be performed with this instrument.

Med-Science Electronics, Inc.
formerly
Custom Engineering & Development Co.
2647-49 Locust St.
Dept. E-I-St. Louis 3, Mo.

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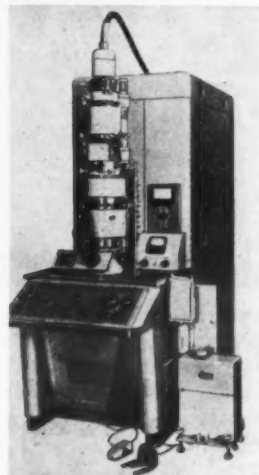
PORTABLE ECG



New 17-lb "Cardiopak" Electrocardiograph, Model MC-1TR, provides diagnostic cardiographic traces equal in detail to larger instruments. Instrument incorporates automatic stabilization during lead switching, push-button control for recording, sensitivity adjustment for $\frac{1}{2}$ normal amplitude, 1-mv standardization without use of batteries, chart speeds of 24 and 50 mm. Reloading accomplished in seconds. Can be used as recorder for other physiological parameters such as EEG, pulse, respiration and temperature with auxiliary equipment.—Dallons Laboratories, Inc., 5066 Santa Monica Blvd., Los Angeles 29, Calif.

CIRCLE 253 ON READER-SERVICE CARD

ELECTRON MICROSCOPE



New JEM-6A Electron Microscope has unusual series of attachments that can heat, chill, or subject a specimen to stress, take motion pictures of moment-to-moment changes. Instrument's resolving power is 12 Angstrom units under ordinary conditions, 8A under ideal operating conditions; continuous direct magnification is 600X to 200,000X. Controls are on sloping front panel within easy reach. Two other accessories: high-resolution diffraction attachment, direct-reflection attachment.—Fisher Scientific Co., 360 Fisher Bldg., Pittsburgh 19, Pa.

CIRCLE 254 ON READER-SERVICE CARD

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PRODUCTS LISTED CIRCLE
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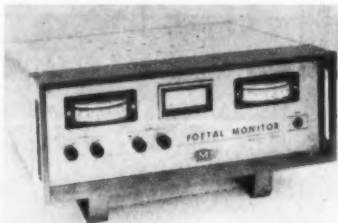
REFRIGERATED CENTRIFUGE



New Model HR-1 high-speed, high capacity Refrigerated Centrifuge offers 5 angle heads ranging from 12-place, 7 ml to 6-place, 250 ml. Standard 8-place, 50-ml head offers 40, 180 x G at maximum speed of 18,500 rpm. Continuous Flow System employing new method of high-speed, continuous flow centrifugation is available. Temperatures as low as -20°C are controlled within $\pm 1^{\circ}\text{C}$. New, improved drive unit contains self-centering feature which eliminates need for critical balancing of samples.—International Equipment Co., 1284 Soldiers Field Rd., Boston 35, Mass.

CIRCLE 255 ON READER-SERVICE CARD

FETAL ECG



New Fetal Monitor, approximately $6\frac{1}{4} \times 4\frac{1}{4} \times 18$, designed for use in obstetrical clinic simultaneously measures and displays fetal and maternal heart rates.—Electronic Medical Systems, Inc., 1449 University Ave., St. Paul 4, Minn.

CIRCLE 256 ON READER-SERVICE CARD

OXIMETER RECORDING SYSTEM



New X-90A Oximeter Recording System can be used for performing dye-dilution curves indicative of heart function with either Evans Blue or Cardio-Green dye; also for immediate, continuous determinations of blood oxygen saturation. As oximeter, it has standard deviation from Van Slyke analysis of approximately 2% in 90 to 100% saturation range. It is insensitive to changes in flow rate and hematocrit, and is relatively unaffected by age, color, blood hemoglobin content or ear thickness. New servo-type ink-writing recorder has $9\frac{1}{2}$ " grid. Bulletin X-90/61.—Waters Corp., Box 529, Rochester, Minn.

CIRCLE 257 ON READER-SERVICE CARD

DUST-FREE CABINET

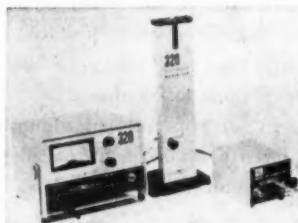


New light-weight Cleannaire cabinet is constructed of clear acrylic plastic with steel fittings, is useful for research requiring reliable, dust-free environment. Standard size is $22 \times 35 \times 29$ ". Filter removes dust particles down to a 0.5μ .—Plastigage Corp., PlastiCo Div., 915 E. South St., Jackson, Mich.

CIRCLE 258 ON READER-SERVICE CARD

CAUDAL PLETHYSMOGRAPH

New Model 320-1 Caudal Plethysmograph is an integrated system consisting of the Decker Micro Differential Pressure Meter with a 0.3 " H_2O capsule, along with a regulated pressure system and an indicating electrical manometer. The electrical manometer provides a calibration pulse for incremental pressure changes in the caudal cuff, permitting the correlation between cuff pressures and waveform amplitudes. The basic manometer consists of electrical contacts introduced into the mercury column that changes the d-c signal level across the sampling resistor in proportion to the increasing or decreasing mercury column. At the point of wave form disappearance, the manometer indicates visually on a dual-channel strip-chart recorder the pressure at which the pulse disappears. This point is considered as a



systolic pressure point. The sensor consists of a Decker Micro Differential Pressure Capsule that converts the small volume changes of the caudal, which is inserted into an air tight chamber, into a proportional electrical signal. This signal is available for recording or audible examination. The regulated air pressure system slowly introduces a pressure into the caudal cuff that simultaneously activates the electrical manometer. With the two-channel recorder, the pulse amplitude is displayed on one channel while the pressure variation is indicated on the other. At the point where the wave form disappears, the point of systolic has been reached. If it is compared with the pressure channel, systolic point level may be directly interpreted back to the absolute pressure. This system permits the monitoring of parameters without exciting subject animals; it eliminates false data due to anxiety caused by uncomfortable position.—The Decker Corp., 45 Monument Rd., Bala-Cynwyd, Pa.

CIRCLE 259 ON READER-SERVICE CARD

ELECTRODE FOR ELECTROCARDIOGRAMS

The Telectrode affords ease of application, infinite placement and long term performance not found in conventional electrodes. Each Telectrode consists of a patch-type adhesive bandage with a metallic screen, paste reservoir, and contact snap fastener. The fastener easily connects to a patient cable which is adaptable to any standard ECG recording apparatus. Though Telectrodes are disposable, they have demonstrated durability during extended monitoring. Their light weight and small size— $1\frac{1}{2}$ inches square—enable subjects to wear them comfortably for as long as 24 hours. The flexible quality of the Telectrode allows it to comply with the surface motion of the skin, yet its adhesiveness maintains necessary contact. The kit contains 50 Telectrodes, one twin-lead patient cable with mating connector, a sample of paste, and six applicators. Used in more than 1,200 clinical cases, the Telectrode has shown very low skin resistance and the resultant ECG's have been of uniform high quality. The RKG 100, a miniaturized radio broadcasting system, makes practical for the first time the taking of electrocardiograms while subjects are exercising.—Telemedics, Inc., Southampton, Pa.

CIRCLE 260 ON READER-SERVICE CARD

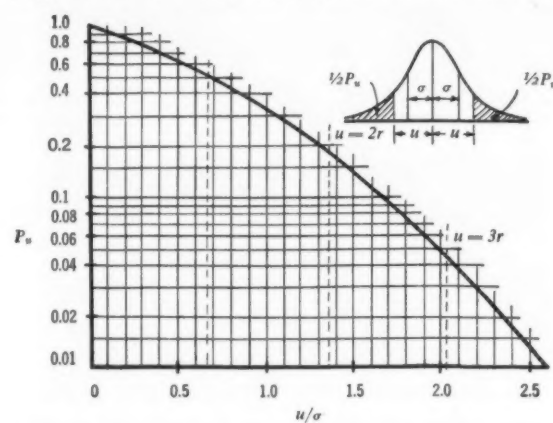
PORTABLE ECG

New 24-lb Model RS-100 direct-recording ECG uses 50-mm paper at 25 and 50 mm/sec speeds. Circuit stabilizes within 0.1 sec; high frequency response of 90% to linear at 60 cps; sensitivity—maximum deflection swing is 20 mm at 1 mv. Phono-amplifier, cardioscope, and transistorized stethoscope available.—Lumiscrite Co., 72 E. 13 St., New York 3, N. Y.

CIRCLE 261 ON READER-SERVICE CARD

Statistics: Standard Deviation

Probably the most important statistic attached to a sample count is called the standard deviation (σ) and is equal to the square root of the total number of counts recorded. "Standard deviation" signifies the probability ("P") is 30% that the true count will fall outside of the range of numbers from the recorded count minus σ to



the recorded count plus σ . In other words, if the experiment was repeated 100 times, 70 of the measurements would be within \pm the standard deviation of the true count. Furthermore, it can be shown that the probability that the true count lies outside of the sample count ± 2 standard deviations is only about 5%; and a generalized relationship between the probability of the true count being within the sample count \pm any number ("u") is given on the chart . . .

Assuming an average of 982 counts determined by repeated one minute runs,

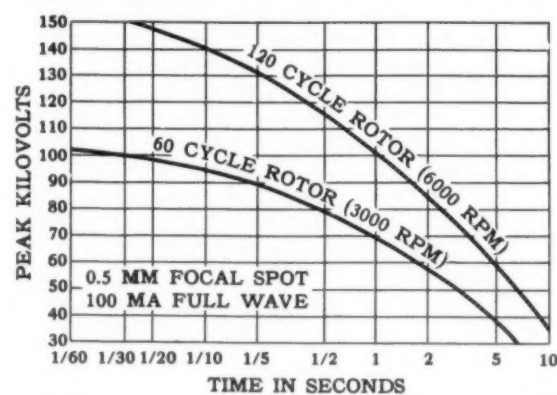
$$\sigma = \sqrt{982} = 31.2 \text{ counts}$$

To find the fraction of the runs which will deviate from the average by more than 5% (i.e. fall outside of 982 ± 49.1 counts) find on chart the value of P_u for $u/\sigma = 49.1/31.2 = 1.57$, and read $P_u = 0.12$ or 12%. This can also be interpreted as showing the probability that any succeeding one minute reading will fall outside of 982 ± 49.1 counts. . . (From 56-page Catalog A-5, Baird-Atomic, Inc., 33 University Rd., Cambridge 38, Mass.)

FOR THIS LITERATURE CIRCLE 262 ON READER-SERVICE CARD

High-speed Rotation of X-ray Tubes

The greatest part of the high-voltage used in generating X-rays is dissipated in the form of heat concentrated in the focal-spot area . . . With a rotating anode, the focal spot is continuously being presented with a new, cooler surface and volume of tungsten for the absorption and dissipation of the generated heat. The heat is spread over



a complete circular band with a diameter just slightly less than the outside diameter of the anode disc. The point on this band immediately under the electron beam will be at the highest temperature with the temperature receding for points on the band progressively farther away from the focal spot in the direction of rotation . . .

The real value of high-speed rotation is most graphically demonstrated when the loading capacity curves for two different rotation speeds are shown on a single chart. The accompanying charts, based on data furnished by X-ray tube manufacturers, show how much higher kilovoltage and milliamperage can be put into a given focal spot size with the rotor operated at 120 cycles rather than 60 cycles.

In the curves, comparing 3000 rpm with 6000 rpm anode rotation, using 0.5 mm focal spot as a basis—100 pkv at 100 ma would be limited to a 1/30 second exposure with a 3000 rpm rotor. However, using a 6000 rpm rotor speed, the same power could be applied for as long as 1 second without overloading the tube . . . (From Form 6105, Continental X-ray Corp., 1536 N. Clybourn Ave., Chicago 10, Ill.)

FOR THIS LITERATURE CIRCLE 263 ON READER-SERVICE CARD

Blood Pressure Monitoring

In monitoring the patient's blood pressure, the Analog-to-Pressure Converter is capable of preselecting any desired pressure, transferring this pressure accurately to the arm band, and automatically maintaining the pressure constant to an accuracy of $\pm 0.025\%$. The arm band contains a pressure transducer capable of detecting and audibly reproducing the heart beat.



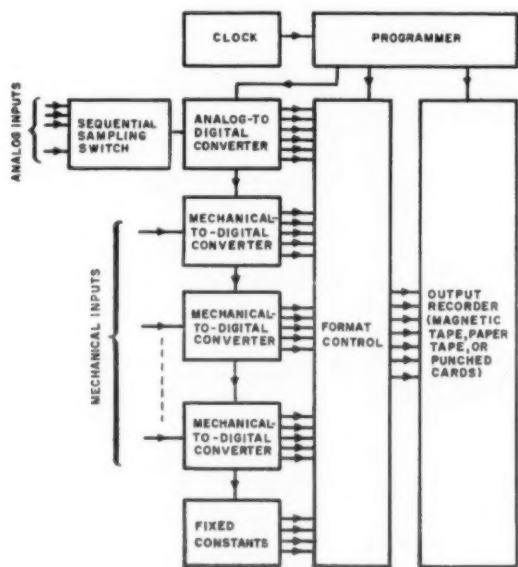
Systolic and diastolic pressures of the patient are established prior to the medical procedure by using the conventional blood pressure instrument. These pressures are then dialed into the Analog-to-Pressure Converter. A solid state timer-switching network is employed to periodically and systematically sample each pressure...

The Analog-to-Pressure Converter can be utilized in virtually all phases of the bio-medical field requiring precise control and/or measurement of pressures and vacuums. Typical applications... include, but are not limited to, the following: control and measurement of intra-ocular pressure, oxygen and anesthesia regulation and monitoring, aero-medical field usage (such as flight suit and cabin pressure regulating systems), control and measurement of pressures in low pressure chambers, decompression chamber pressure regulation... (From 8-page bulletin and 4-page Application Report, Moletronics, Div. Motec Industries, Inc., 6344 Arizona Circle, Los Angeles 45, Calif.)

FOR THIS LITERATURE CIRCLE 264 ON READER-SERVICE CARD

Data Conversion Systems

Data conversion systems can be designed to accept time-varying electrical inputs (EKG, PCG, and EMG),... and several different inputs simultaneously...



The accuracy requirements of a conversion system depends on the accuracy that is inherent in the input data... Most biological and medical research problems require accuracies to about 8 or 10 bits... The input to the analog-to-digital conversion system can be any combination of electrical voltages, positions of mechanical devices, or constants. The input data are sequentially sampled and converted to digital form by an analog-to-digital or mechanical-to-digital converter... (From new 4 page bulletin, Airborne Instruments Lab., Div. of Cutler-Hammer, Inc., Deer Park, L. I., N. Y.)

FOR THIS LITERATURE CIRCLE 265 ON READER-SERVICE CARD

Multichannel Temperature Programmer

The Type 440 Multichannel Temperature Programmer performs rapid, high-precision measurement of human body temperatures and automatic computation of weighted-mean body temperature. The equipment includes 24 interchangeable thermistor probes, 24 input channels, measurement and computer circuits,

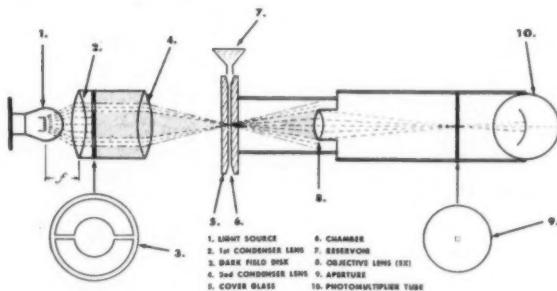


programming circuits, and a four-digit numerical display and printer. Specially aged, interchangeable thermistor probes are incorporated into linearizing networks which are part of a measurement bridge. The measurement bridge includes a self-balancing digital ratio meter... The four-digit numerical display and printout permits measurement precision to 0.01 C with an overall accuracy of ± 0.05 C over the range of significant body and skin temperatures... (From new 4-page bulletin, Airborne Instruments Lab., Div. of Cutler-Hammer, Inc., Deer Park, L. I., N. Y.)

FOR THIS LITERATURE CIRCLE 266 ON READER-SERVICE CARD

Blood Cell Counter

The Model 75 Blood Cell Counter is a relatively small, bench-top unit composed essentially of an optical section and an electronic section. The optical section has a pre-focused light source, condenser lenses, a dark field stop, an inspection chamber through which the diluted blood samples flow, an objective lens, a field limiting aperture, and a photomultiplier tube... The condenser lenses and dark field disk bring a hollow cone of light to focus on the inspection chamber. The rays of light intersect at this point and diverge to form another hollow cone of light to the right of the chamber... As a result, the main body of light rays focused on the chamber pass outside the objective lens. Only those rays which are intercepted and scattered by a cell passing through the chamber reach the objective lens.



The aperture determines the exact inspection zone in the chamber. Only light from a cell in the inspection zone falls on the photomultiplier tube, which generates a signal for the exact duration of each cell's presence. Electronic circuitry then determines the percent of time that cells are present in the inspection volume. (Inspection volume is the depth of the chamber multiplied by the projected area of the aperture). It is this information that is directly related to cell concentration. Continuous read-out of cell concentration is provided by a large, easy-to-read panel meter... (From 4-page bulletin, Sanborn Co., Waltham 54, Mass.)

FOR THIS LITERATURE CIRCLE 267 ON READER-SERVICE CARD

Bio-electrodes

biode (bi'ode), a. A unique electrode for the easy monitoring of bioelectric potentials. Originally developed for holding and attaching electrodes to human or animal subjects for space medicine applications, the biode offers these characteristics: 1. Subjects have worn working biodes for as long as 20 days. 2. The biode is comfortable and free from allergic materials. 3. The use of biodes greatly reduces and often eliminates motion artifacts. 4. They are simple and easy to apply. 5. Biodes are economical—both in time and in money... (From collection of advance data sheets, Epsco Medical Div. Epsco, Inc., 275 Massachusetts Ave., Cambridge 39, Mass.)

FOR THIS LITERATURE CIRCLE 268 ON READER-SERVICE CARD



MINI-POLYGRAPH

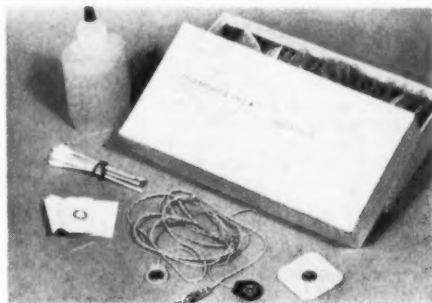
"Simplicity and accuracy for student or scientist"

- Compact versatility — EEG, ECG, and 2 pressure channels or ECG and 3 pressure channels
- Transducers plug in directly — no extra power supply or pre-amplifiers needed
- Rugged and sturdy
- Plug-in printed circuits
- Rectilinear recording with ink on 6" paper with millimeter square marking; simple and reliable linkage — only two moving parts
- Anti-clogging inking system
- Instantaneous speed change — 6 speeds

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Middleton, Wisconsin

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TELECTRODE* A Significant NEW Advance in Electrode Design

The newly developed Teletrode solves many of the problems of conventional electrodes. The Teletrode is a patch type adhesive bandage with a metallic screen, paste reservoir, and contact snap fastener. Lightweight and disposable, each measures only 1 1/2 inches square. The Teletrode is easily applied, complies with the surface motion of the skin and can be worn comfortably by the subject during extended testing. Used in more than 1,200 cases, the Teletrode shows very low skin resistance and the EKG's are of uniform high quality.

The Teletrode connects by its snap fastener to a six-foot, twin lead patient cable which is easily adaptable to any standard recording apparatus or other instrumentation.

A Teletrode Kit is now available consisting of 50 Teletrodes, one twin lead patient cable with mating connector, a sample quantity of Teletrode Paste, and six applicators.

*Registered trademark, patent pending

TELECTRODE KIT—\$20.00 plus postage

Order through Teletrode Department

TELEMEDICS INC. Southampton, Pa.

A Subsidiary of Vector Manufacturing Co., Inc.

CIRCLE 270 ON READER-SERVICE CARD

Medical Instrument and Electronics Buyers' Guide

Dear Reader

MEDICAL ELECTRONICS NEWS announces the inauguration of a buyers' guide for the medical instrumentation and electronic device field, to appear in 1963. To make this buyers' guide of the greatest value to you, the guide should list the sources of the products you specify, purchase and use.

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October 14-17

International Conference on Ionization of the Air, Franklin Institute, Philadelphia, Pa. The technical program will feature authorities in the field of air ionization. Topics to be covered: Physics of Air Ions, Methods of Producing and Measuring Air Ions, Relationship of Various Weather Factors to Natural Ion Levels, Effect of Air Contaminants on Ion Levels, Physiological Response to Air Ions, Psychological Response to Air Ions, Mechanisms of Gaseous Ion Action on Living Matter, Possible Medical Applications of Air Ions. Address inquiries to American Institute of Medical Climatology, 1618 Allengrove St., Philadelphia 24, Pa.

October 20-22

34th Annual Scientific Sessions of the American Heart Association (includes 6 sessions on clinical cardiology), Americana Hotel, Bal Harbour, Miami Beach, Florida. For information write American Heart Association, 44 E. 23rd St., New York 10, N. Y.

October 20

Fifth Annual Symposium on Advances in Tracer Methodology, sponsored by New England Nuclear Corp., Shoreham Hotel, Washington, D. C. For further information contact Paul A. McNulty, New England Nuclear Corp., 575 Albany St., Boston 18, Mass.

October 25-26

1961 Computer Applications Symposium, Morrison Hotel, Chicago, Ill. Sponsored by Armour Research Foundation of Illinois Institute of Technology. For information write to Benjamin Mittman, Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

October 26-27

Study-Conference, The Role of Bio-medical Engineering in Universities and Hospitals, Sheraton-Fontenelle Hotel, Omaha, Neb. Sponsored by University of Nebraska College of Medicine, Electrical Techniques in Medicine and Biology Committee of AIEE, Professional Group on Bio-Medical Electronics of IRE. For information write Harold Beenken, University of Nebraska College of Medicine, Omaha, Neb.

November 6-8

Annual Convention, American Documentation Institute, Somerset Hotel, Boston, Mass. For information write to P. D. Vachon, Melpar, Inc., 11 Galen St., Watertown 72, Mass.

December 7-9

New York Academy of Sciences Conference on The Cervix, Henry Hudson Hotel, New York, N. Y. Contact Conference Co-chairman: Warren R. Lang, Jefferson Medical College, Phila. Pa., or Alfred B. Kupferberg, Ortho Research Foundation, Raritan, N. J.

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